

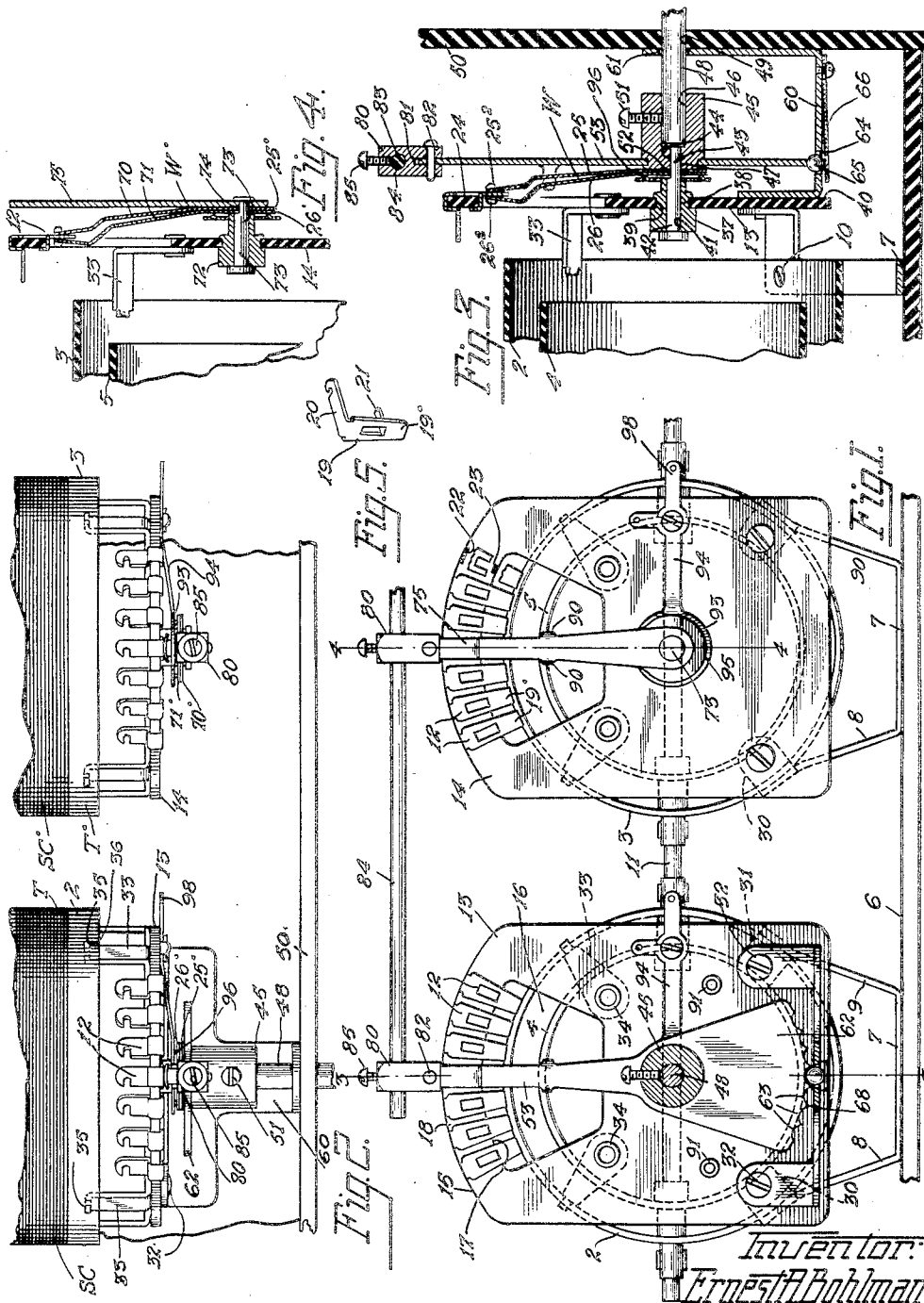
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SWITCH MECHANISM

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SWITCH MECHANISM

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My invention relates to tuning couplers or transformers used in radio receiving systems, and has to do more particularly with tuning couplers or transformers in which the inductance of one of the windings of the transformer is varied in steps by means of a switch arrangement, and an object of my invention resides in a novel method of construction and operation of the same.

A feature of my invention has to do with the contact structure to which the taps from the tapped windings of the transformers are secured, and the novel means employed for securing the contacts to the supporting panels.

Another feature of my invention has to do with the manner in which the wiper arms for varying the inductances of the windings of the transformers by steps are associated with a single control arrangement.

A still further feature of my invention is the provision of a novel arrangement in association with the wiper arms of the transformers to provide means for connecting the said wiper arms with the external circuits.

The above features as well as others not specifically pointed out will be more fully described and explained in the ensuing specification, and for a more complete understanding of my invention reference may be had to the accompanying drawing in which like reference characters in the several views denote like parts, and in which:

Fig. 1 is a front elevation of the switching mechanism of my invention in association with a pair of transformers,

Fig. 2 is a plan view of Fig. 1,

Fig. 3 is a sectional view along the line 3-3 of Fig. 1 and clearly illustrates the means which controls the wipers that engage contacts associated with the tapped secondaries of the transformers,

Fig. 4 is a sectional view along the line 4-4 of Fig. 1, and

Fig. 5 is a perspective view of a contact illustrating its shape before being secured to the panel.

Referring now more in detail to my invention as illustrated in the accompanying drawing the switching mechanism of my invention

is associated with a pair of transformers T and T' comprising stator tubes 2 and 3. Mounted within the stator tubes 2 and 3 are rotatable rotor tubes or elements 4 and 5 shown in dotted lines in Fig. 1. The stator tubes or elements 2 and 3 are mounted upon a base board 6 by U shaped brackets 7 which are provided with diverging legs 8 and 9 which have tapped orifices, and screws 10 which pass through suitable orifices in the stator tubes 2 and 3 have threaded engagement with the tapped orifices in the respective legs 8 and 9 of the brackets 7 to secure them to the bracket 7, the said bracket 7 being in turn secured to the base board 6 by suitable screws. The rotor tubes 4 and 5 are supported on a rod 11 of suitable insulating material and may be rotated 90 degrees or until they are at right angles to the axis of the stator tubes 2 and 3.

The stator coils SC and SC' are tapped and these taps are led to contacts 12 mounted on the panels 13 and 14, and as the contacts 12 are mounted on the panels 13 and 14 in a similar manner and are of similar construction and arrangement the description of one will suffice for a clear understanding of the same. The panel 13 associated with the stator coil SC is rectangular in shape and of suitable insulating material such as bakelite and is provided with an arcuate shaped end 15. The panel 13 is also provided with a suitable opening 16, the top edge 17 of which is arcuate and concentric with the arcuate end 15 of the panel 13. The arcuate end 15 of the panel 13 and concentric arcuate edge 17 of the orifice 16 in the panel 13 form an arcuate shaped bridging member 18 to which the contacts 12 are secured and arranged in an arc of a circle. As the contacts 12 are similar in construction and the method of securing the same to the arcuate bridging member 18 is the same the description of one will suffice for a clear understanding. The contact 12 comprises a body portion 19 and an integrally formed extended portion 20 at right angles to the body 19 and an angular extending tongue 21 integrally formed with the body portion 19 of the contact 12. Notches 22 and 23 are provided in the arcuate edge 15 of the

panel 13 and arcuate edge 17 of the opening 16 and are of a size and depth to receive respectively the angular extended portion 20 and integrally formed angular extending tongue 21 of the contact 12 to place the body 19 of the same against the face 24 of the panel 13. The respective ends of the portion 20 and tongue 21 extend rearwardly from the rear face of the panel 13 and to secure the contact 12 in position against displacement the extending end of the tongue 21 is bent substantially parallel with the rear face of the panel 13 and an intermediate portion of the angular extension 20 is also bent substantially parallel with the rear face of the panel 13. The end of the angular extension 20 is now bent at right angles to the intermediate portion which is substantially parallel with the rear face of the panel 13 and extends rearwardly and serves as a terminal to which a tap or lead from the tapped stator coil SC is fastened by suitable means such as solder. The end portion 19' of the body 19 of the contact 12 extends below the arcuate edge 17 of the opening 16 in the panel 13 and I show seven contacts 12 secured as above described and these end portions 19' are arranged in an arc of a circle and a double wiper arm W comprising wipers 25 and 26 is adapted to wipe over the end portions 19' of the contacts 12.

While I have illustrated but two transformers T and T' provided with tapped stator coils SC and SC' associated with the panels 13 and 14 carrying contacts to which the taps from the respective coils are led and in which the wipers W are multiply controlled it is to be understood that any number may be provided, and the wiper arms W, associated with the contacts 12 may be multiply controlled and adapted to be moved corresponding distances simultaneously so that the inductances of the transformers T and T' may be varied by placing a different number of turns in circuit. By using a multiple control device the same number of turns will be used on each coil, and thus efficient results will be obtained.

The panel 13 associated with the transformer T is located forward of the same and is secured to the integrally formed angular extensions 30 and 31 of the U shaped bracket 7 which supports the stator tube 2, by means of screws 32, which pass through orifices in the panel 13 and have threaded engagement with tapped orifices in the extensions 30 and 31. Additional securing means for the panel 13 in the form of brackets 33 are secured to the said panel 13 by means of rivets 34. The brackets 33 are provided with integrally formed pin members 35 which extend through orifices 36 in the stator tube 2 to rigidly secure the upper portion of the panel against movement. A bushing 37 provided with a reduced portion 38 is inserted into a suitable orifice 39 in the panel 13, and extends slightly beyond the face 40 of the panel 13 and

this protruding portion is upset or spun over to secure the same in the orifice 39 in the panel 13. The bushing 37 is provided with a central orifice 41 which is adapted to receive a stub shaft 42 that extends through this orifice 41, and the protruding end 43 of the shaft 42 has a portion cut away to form a flat face 44. A bushing 45 is provided with a circular orifice 46 in its one end and with an orifice 47 in its other end, shaped to conform with the formed end 43 of the shaft 42. The formed end of the shaft extends into the said orifice 47 of bushing 45. The one end of the shaft 42 protrudes slightly into the circular orifice 46 of the bushing 45 and this protruding end is staked over to secure the bushing 45 to the shaft 42. A shaft 48 extends through an orifice 49 in the front panel 50 into the orifice 46 in the bushing 45, and a set screw 51 having threaded engagement with a suitable tapped orifice in the bushing 45 engages this shaft 48 to rigidly secure the same in the said bushing. The wipers 25 and 26 of the wiper arm W are provided with substantially circular portions 25' and 26' which are provided with orifices 52 of a size and shape to fit over the formed end 43 of the shaft 42 and these circular portions 25' and 26' of the wipers 25 and 26 when positioned on the stub shaft 42 rest between the bushing 37 in the panel 13 and the face of an arm 53 secured to the bushing 45. It is readily apparent that as the shaft 48 is turned through the medium of a suitable knob secured to the end protruding through the panel 50, the bushing 37, and the stub shaft 42 secured thereto and the wipers 25 and 26 which are supported on the stub shaft 42 are rotated as a whole causing the free ends 25² and 26² of the wipers 25 and 26 to engage the opposite faces of successive contacts 12 as it is rotated from left to right and vice versa, through the medium of the shaft 48. The arm 53 secured to the bushing 45 is also rotated and this movement of the arm 53 is for purposes as will presently be described. A bracket 60 secured to the panel 40 by screws 32 is provided with an upwardly extending portion provided with an orifice 61 through which the shaft 48 extends and serves as a bearing when the same is rotated, and the bushing 37 secured to the panel 13 and through which the stub shaft 42 extends serves as a bearing for the shaft 42 when it is rotated through the agency of the shaft 48 as just described.

To prevent any overrun of the free ends 25² and 26² of the wipers 25 and 26 as they pass from one contact 12 to the next and also to produce a snap action as the wipers 25 and 26 pass from one contact 12 to the next, the arm 53 is provided with a downwardly extended portion 62 provided with a plurality of notches 63 in the arcuate shaped edge equal in number to the contacts 12 secured to the panel 13. The bracket 60 secured to the panel

13 as already described is provided with an orifice 64 adapted to receive a ball bearing 65. A leaf spring 66 secured at its one end to the bottom face of the bracket 60 has its free end engaging the ball bearing 65 which rests in the orifice 64 to maintain the same in engagement with the notches 63 in the extended portion 62 of arm 53. The ball bearing 65 co-operates with the notches 63 in the extended portion 62 of the arm 53 and as the shaft 48 is rotated, the arm 53 is also rotated causing a tooth 68 formed by two adjacent notches 63 to engage the ball bearing 65 and force it down against the normal tension of the spring 66 and as the arm 53 continues its rotation the ball 65 passes the tooth 68 and acts upon the next notch 63 under the influence of the spring 66 so as to give a quick snap action to the wipers 25 and 26 of the contact arm W as they pass from one contact 12 to the next.

The wipers 70 and 71 associated with the wiper arm W' of the transformer T' are rotatably supported in a manner similar to that described in connection with the wipers 25 and 26 and will now be described. A bushing 72 is secured to the panel 14 by staking its protruding end and is provided with a central orifice which receives a stub shaft 73. The stub shaft 73 is provided with a flat portion 74 and the wipers 70 and 71 and arm 75 are provided with orifices shaped to permit them being slipped over the end of the stub shaft 73. The shaft 73 protrudes slightly beyond the face of the arm 75 and this protruding end is staked to secure the wipers 70 and 71 and arm 75 to the stub shaft 73.

A link 80 provided with a bifurcated end 81 is associated with the free ends of each of the arms 53 and 75. The bifurcated ends 81 straddle the arms and are pivotally secured thereto by means of pivot pins 82. Each link is provided with an orifice 83 which is adapted to receive a rod 84. Set screws 85 having threaded engagement with suitable tapped orifices in the ends of the links 80 engage the rod 84 to rigidly secure the rod 84 to the links 80 to connect the rod 84 with the arms 53 and 75 associated with the wiper arms W and W' comprising respectively wipers 25, 26 and 70, 71. It is readily apparent that when the shaft 48 is operated through the agency of a suitable mechanism secured thereto, the arm 53 secured to the bushing 45 to which the shaft 48 is secured is rotated and through the agency of the links 80 which connect the arms 53 and 75 to the connecting rod 84 the movement of the arm 53 is transmitted to the arm 75 to move them simultaneously.

The arms 53 and 75 are provided with depending legs 90 which are spaced apart so as to span the wipers 25 and 26 and wipers 70 and 71 of the wiper arms W and W'. The arm 53 is associated with the stub shaft 42 as before described and the movement of the arms 53 and 75 causes rotation of the stub

shafts 42 and 73 and as the wiper arms W and W' are secured thereto their free ends are rotated from one contact to the next. A pair of stop pins 91 secured to the panel 13 are provided to limit the movement of the wipers 25, 26 and 70, 71 of the wiper arms W and W', from left to right and vice versa, the stops 91 of course being engaged by the respective edges of the depending portion 62 of the arm 53.

Disks 93 having orifices of a size to fit over the reduced portion of the bushings 37 and 72 secured to the panels 13 and 14 are provided with extended portions 94 which are secured to the panels 13 and 14 by means of suitable screws. The extended portions 94 are so formed that when the disks 93 are positioned on the bushings 37 and 72 between the face of the panels 13 and 14 and the circular portions 25' and 26' and 70' and 71' of the respective wiper arms W and W', the said disks 93 are placed under tension. The faces 95 of the disks 93 are provided with a plurality of embossed portions 96 formed by a suitable punch press operation and these embossed portions firmly engage the faces of the circular portions 26' and 71' of the wipers 26 and 71 of the respective double wiper arms W and W' to provide rubbing contacts between the disks 93 and the circular portions of the respective wipers 26 and 71. The extended portions 94 of the disks 93 are provided with integrally formed terminals 98 to which external conductors are connected and through the agency of the extensions 94 and the disks 93 which are in contactal engagement with the circular portions 26' and 71' of the wipers 26 and 71 of the respective wiper arms W and W' current is thus carried to the wipers.

While I have illustrated and described a preferred embodiment of my invention it is to be understood that I do not wish to be limited to the exact structure as shown but aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

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

1. A device of the character described including a mounting panel having an orifice therein, contacts mounted flat against said panel having an integrally formed portion extending into said orifice and a pair of integrally formed portions adapted to secure said contacts to said panel, and a wiper arm extending into said orifice and engaging the said first extending portion of said contacts.

2. A device of the character described including a flat mounting panel, contacts having integrally formed members for securing said contacts flat against the said panel, and a pair of wipers for engaging the opposite sides of said contacts.

3. A device of the character described including a mounting panel, contact members having integrally formed means extending into notches in said panel to secure said contacts flat against said panel, and wipers rotatably secured to said panel for engaging the opposite sides of said contacts.

4. A device of the character described including a mounting panel provided with an arcuate shaped end, said panel having an orifice therein provided with an arcuate edge parallel with said arcuate end to form an arcuate bridging member, a plurality of flat contacts having an integrally formed portion extending into said orifice and arranged in an arc of a circle and secured to said bridging member, and a wiper arm comprising a pair of wipers supported on a rotatable shaft adapted to engage respectively the opposite faces of the extending portion of said contacts.

5. A device of the character described including a mounting panel provided with an arcuate shaped end, said panel having an orifice provided with an arcuate edge parallel to said arcuate end to form an arcuate bridging member, notches in the respective edges of said bridging member, contacts provided with integrally formed members resting in said notches, said members protruding beyond said panel to provide means for securing said contacts to said bridging member of said panel.

6. A device of the character described including a mounting panel provided with an arcuate shaped end, said panel having an orifice therein provided with an arcuate edge parallel with said arcuate end of said panel to form an arcuate bridging member, notches in the respective edges of said bridging members, contacts provided with integrally formed angularly extending members resting in said notches, said members protruding beyond said panel to provide means for securing said contacts to said bridging member of said panel, and a wiper arm comprising a pair of wipers supported on a rotatable shaft adapted to engage respectively the opposite faces of said contacts.

7. A device of the character described including a mounting panel provided with an arcuate shaped end, said panel having an orifice therein provided with an arcuate edge parallel with said arcuate end to form an arcuate bridging member, notches in the respective edges of said bridging members, contacts each provided with a pair of integrally formed angularly extending members adapted to rest in said notches and projecting beyond the face of said panel, one of each of said pair of angularly extending members being bent parallel to said panel, said other of said pair of extending members having an intermediate portion bent parallel with

said panel, said bent portions securing said contacts to said bridging member.

8. A device of the character described including a mounting panel provided with an arcuate shaped end, said panel having an orifice therein provided with an arcuate edge parallel with said arcuate end to form an arcuate bridging member, notches in the respective edges of said bridging members, contacts each provided with a pair of integrally formed angularly extending members adapted to rest in said notches and projecting beyond the rear face of said panel, one of each of said pair of angularly extending members being bent parallel to said panel and said other of said pair of extending members having an intermediate portion bent parallel with said panel, said bent portions securing said contact to said bridging member, the said end of said other of said extending members being angularly displaced relative to its intermediate bent portion to form a terminal for said contact.

9. A device of the character described including a mounting panel provided with an arcuate shaped end, said panel having an orifice therein provided with an arcuate edge parallel with said arcuate end to form an arcuate member, contacts each of which is provided with a pair of integrally formed angularly extending members adapted to rest in said notches and projecting beyond the rear face of said panel, one of each of said pair of angularly extending members being bent parallel to said panel and said other of said pair of extending members having an intermediate portion bent parallel with said panel, said bent portions securing said contact to said bridging member, and a wiper arm comprising a pair of wipers supported on a rotatable shaft adapted to engage the opposite faces of said contacts.

10. A device of the character described including a mounting panel provided with an arcuate shaped end, said panel having an orifice therein provided with an arcuate edge parallel with said arcuate end to form an arcuate bridging member, notches in the respective edges of said bridging members, contacts provided with integrally formed angularly extending members resting in said notches, said extending members protruding beyond said panel to provide means for securing said contacts to said bridging member of said panel, a wiper arm comprising a pair of wipers and an arm supported on a rotatable shaft, said pair of wipers being adapted to engage respectively the opposite faces of said contacts, and means integrally formed with said arm cooperating with spring pressed means for maintaining the said wipers in engagement with the selected contact.

11. A device of the character described including a mounting panel having an orifice provided with an arcuate shaped side, con-

tacts having integrally formed portions extending into said orifice secured against the arcuate shaped side of said panel by means extending through said panel, and a pair of wipers rotatably secured on one side of said panel for engaging the opposite sides of said contacts.

12. A device of the character described including a panel having an orifice with an arcuate shaped side, contacts having an integrally formed portion extending into said orifice and secured flat against the extending portion of said panel, and a pair of wipers rotatably supported on one side of said panel for engaging the opposite sides of said contacts.

13. A device of the character described including a mounting panel, contacts secured to said panel, wipers secured to a rotatable shaft supported by said panel, said wipers adapted to engage both sides of said contacts, and a wiper arm having side portions adapted to extend on each side of said wipers to control the operation of said wipers.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 4th day of March, 1927.

ERNEST A. BOHLMAN.