

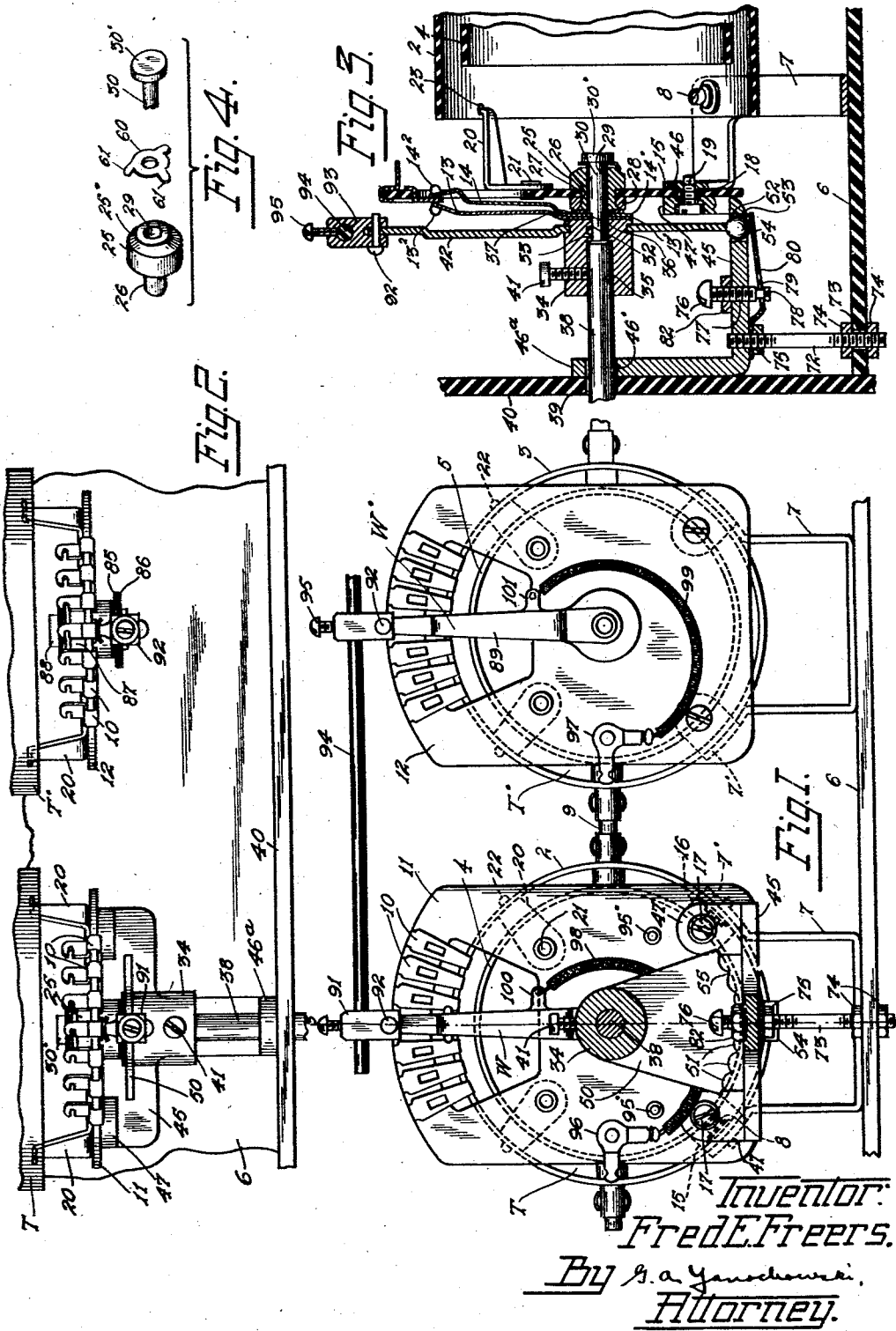
Dec. 24, 1929.

F. E. FREERS

1,740,977

SWITCH MECHANISM

Filed Sept. 7, 1928



Inventor:
Fred E. Freers.
By *s. a. Yandow*,
Attorney.

UNITED STATES PATENT OFFICE

FRED E. FREERS, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

SWITCH MECHANISM

Application filed September 7, 1928. Serial No. 304,583.

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 arrangement of parts and the operation of the same.

A feature of my invention resides in the multiple control arrangement of such devices and in the construction and control of the apparatus by which the inductances of the secondaries of the transformers or couplers of a multiple arrangement are varied in steps through the agency of a wiper and contact arrangement and in which the wipers associated with the several inductances of the multiple arrangement are controlled by means of a single control arrangement.

Another feature of my invention is the provision of an improved wiper shaft bearing in which spring means is provided to prevent longitudinal movement of the shafts upon which the wipers of the multiple wiper arrangement are supported and also prevent the wipers associated with the member controlling the movement of the multiple arrangement from being moved out of their normal path of travel as the shaft controlling the movement of the wipers moves the same from one contact set to the next.

Another feature of my invention is the provision of adjustable means to permit the alignment of the operating shaft of the control member and the wiper supporting shaft.

Still another feature of my invention is the provision of adjustable means to permit the adjustment of the spring which in association with a ball bearing controls the snap action of the contact wiper arms as they move from one contact set to the next.

The above features as well as others not specifically pointed out will be more fully described in detail in the following specification and for a more complete understanding of my invention reference may be had to the accompanying drawings 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 taps from secondaries of the transformers and,

Fig. 4 is a fragmentary disassembled perspective view of the stub shaft, and bearing for the shaft and the spring means for preventing longitudinal movement of the same.

Referring now more in detail to my invention as illustrated in the accompanying drawing the switching mechanism of the same 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 angular extensions 7'. These angular extensions 7' are provided with tapped orifices and screws 8 pass through suitable orifices in the stator tubes 2 and 3 and have threaded engagement with the tapped orifices in the respective angular extensions 7' of the U shaped brackets 7 to secure them to the same. The brackets 7 which support the stator tubes or elements 2 and 3 are in turn secured to the baseboard 6 by suitable screws. The rotor tubes or elements 4 and 5 are supported on a rod 9 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 stators 2 and 3 support suitable windings (not shown in the drawing) which are tapped and these taps are joined to contacts 10 mounted upon panels 11 and 12. The contacts 10 of each panel are arranged in an arc of a circle and a double wiper arm W comprising wipers 13 and 14 is adapted to wipe over the contacting ends of its respective groups of contacts 10.

While I have illustrated but two trans-

formers T and T' it is to be understood that any number may be provided, and the wiper arms W, associated with the contacts 10 may be multiple controlled and adapted to be moved corresponding distances simultaneously so that the inductances of the transformers T and T' may be varied by placing different numbers 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 11 associated with the transformer T is located forward of the stator element 2 and is secured to the integrally formed angular extensions 15 and 16 of the U shaped bracket 7 by means of screws 17 which pass through orifices 18 in the panel 11 and have threaded engagement with tapped orifices 19 in the extensions 15 and 16. Additional securing means for the panel 11 in the form of brackets 20 are secured to the panel 11 by means of rivets 21 and are provided with integrally formed pin members 22 which extend through orifices 23 in the stator tube 2 to rigidly secure the upper portion of the panel 11 against movement.

A bushing 25 has a reduced portion 26 which extends through a suitable orifice 27 in the panel 11. A collar 28 fits over the protruding end of reduced portion 26 and the end of the portion 26 is upset or spun over to secure collar 28 in place and thus retain bushing 25 in the orifice 27. Extending through a central orifice 29 in the bushing 25 is a stub shaft 30 the protruding end of which is cut away at one side to form a D shaped portion having a flat face 32. The D shaped end of shaft 30 extends into a D shaped orifice 33 in one end of a bushing 34 and protrudes into a circular orifice 35 in the other end of the bushing 34. The protruding formed end of the stub shaft 30 extending into the circular orifice 35 of the bushing 34 is staked over or upset to secure the bushing 34 to the stub shaft 30.

The wipers 13 and 14 of the contact wiper arm W are provided with substantially circular portions 13' and 14' which are provided with D shaped orifices 36 of a size to fit over the D shaped end of the shaft 30 and are positioned thereon between the bushing 34 secured to the shaft 30 and a washer 37 supported on the shaft 30 between the circular portion 14' of the wiper 14 and the collar 28 on the bushing 25.

A shaft 38 extends through an orifice 39 in the front panel 40 into the circular orifice 35 in the bushing 34. A set screw 41 having threaded engagement with a suitable tapped orifice in the bushing 34 engages this shaft 30 to rigidly secure the same in the said bushing 34. It is readily apparent that as the shaft 38 is turned through the medium of a suitable knob secured to shaft 38 the bushing 34 and the stub shaft 30 to which the said

bushing 34 is secured and the wipers 13 and 14 which are supported on the stub shaft 30 are rotated as a whole causing the free ends 13² and 14² of the wipers 13 and 14 to engage the opposite faces of the successive contacts 10. An arm 42 is secured to the bushing 34 in any suitable manner and is also rotated for purposes which will be presently described.

A bracket 45 is secured to the panel 11 by means of the screws 17 which pass through suitable orifices 46 in the upturned ears 47 formed integral with the bracket 45 and orifices 18 in the panel 11 and have threaded engagement with the topped orifices 19 in the angular extensions 15 and 16 of the bracket 7. The bracket 45 is provided with an upwardly extending portion 46^a provided with an orifice 46' which serves as a bearing for the shaft 38 and the bushing 25 serves as a bearing for the stub shaft 30 when it is rotated through the agency of the shaft 38 as just described.

To center the free ends 13² and 14² of the wipers 13 and 14 on contacts 10 and also to produce a snap action as the wipers 13 and 14 pass from one contact 10 to the next the arm 42 is provided with a downwardly extended portion 50 provided in its arcuate shaped edge with a plurality of notches 51 equal in number to the contacts 10 secured to the panel 11. The bracket 45, secured to the panel 11 as already described, is provided with an orifice 52 adapted to receive a ball bearing 53. A leaf spring 54 secured at one end to the bottom face of the bracket 45 has its free end engaging the ball bearing 53 to maintain the same in engagement with the notches 51 in the arcuate shaped edge of the extended portion 50 of the arm 42. As the shaft 38 is rotated the arm 42 is also rotated causing a tooth 55 formed by two adjacent notches 51 to engage the ball bearing 53 and force it down against the tension of the leaf spring 54 and as the arm 42 continues its rotation the tooth 55 passes the ball bearing 53 which is forced into the next notch 51 under the influence of the leaf spring 54 to produce a snap action as the wipers 13 and 14 pass from one contact 10 to the next.

A washer 60 made of suitable spring metal fits over the stub shaft 30 between the enlarged end 30' and the bushing 25. The washer 60 is provided with three integrally formed angularly disposed fingers 61 equally spaced around its peripheral edge which engage an annular beveled edge 25' of the bushing 25. When the parts are assembled on the stub shaft 30 as just described the securing of the bushing 34 to the stub shaft 30 places the fingers 61 under slight tension and this tension takes up any play that may exist between wipers 13 and 14 and washer 37 which rest between the respective ends of the bushings 25 and 34 on the stub shaft 30 to

prevent longitudinal movement of the stub shaft 30 in the bushing 25.

As before described, the wipers 13 and 14 of the contact arm W are moved from one contact 10 to the next through the agency of the connecting shaft 38. There is a natural tendency, as the operator actuates the lever secured to the shaft 38 to rotate the wipers 13 and 14, to apply pressure causing the stub shaft 30 and bushing 34 secured thereto to be forced inward. Without the construction as above described, should any play exist in the stub shaft 30 due to the faulty assembly, this inward movement of the stub shaft 30 would cause the wipers 13 and 14 as they travel over the successive contacts 10 to be moved out of their normal plane or path of travel thus causing the free ends 13² and 14² thereof to engage the respective faces of the contacts 10 with unequal pressure. The washer 60 obviates this possibility.

Owing to slight inaccuracies in assembly the orifice 46' in the extension 46^a of the bracket 45 through which the shaft 38 extends and the orifice 35 in the bushing 34 into which the shaft 38 extends are not always in alignment. The integrally formed ears 47 which provide means for securing the bracket 45 to the panel 11 are provided with clearance holes 46 through which the screws 17 which secure the same thereto pass and provide means whereby the bracket 45 may be adjusted to permit the alignment of the shaft 38 relative to the stub shaft 30.

An adjustable bracket support provides additional means for aligning the respective orifices 46' and 35 for the shaft 38. The support comprises a threaded stud 72 which is suitably secured to the bracket 45 and extends downwardly therefrom through a suitable orifice 73 in the sub-base 6. Nuts 74 having threaded engagement with the stud 72 provide means for adjusting the bracket 45 to align the orifices 46' and 35 and also prevent the shaft 38 from being forced out of alignment relative to the stub shaft 30 should downward pressure be accidentally applied to the shaft 38. A nut 75 having threaded engagement with the upper intermediate portion of the stud 72 secures the leaf spring 54 associated with the ball bearing 53 to the bracket 45.

An adjustable screw 76 having threaded engagement with a suitable tapped orifice 77 in the bracket 45 is provided at its lower end with a reduced portion 78 which is received by notch 79 forming part of the keyhole slot 80 in leaf spring 54. The circular portion of slot 80 is a size to receive the screw end. When the reduced portion 78 of the screw is positioned in notch 79 the screw 76 may be rotated to increase or decrease the tension of the leaf spring 54 and when proper tension is obtained, a lock nut 82 associated with the screw 76 locks the same in its adjusted position. With spring 54 at its proper ten-

sion the contact arm W will have the proper snap action as the wipers 13 and 14 move from one contact 10 to the next.

The wipers 85 and 86 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 13 and 14. A bushing 87 is secured to the panel 12, the same as bushing 25 previously described and is provided with a central orifice which receives a stub shaft 88. The stub shaft 88 is provided with a flat portion and wipers 85 and 86 and arm 89 are provided with D shaped orifices to permit the same to be slipped over this end of the stub shaft 88. The end of the shaft 88 is spun or staked over to secure the wipers 85 and 86 and arm 89 thereto and a washer similar to washer 60 is also provided and is associated with the stub shaft 88 and is for the same purpose as before described in connection with stub shaft 30.

A link 91 provided with a bifurcated end is associated with the free end of each of the arms 42 and 89. The bifurcated ends straddle the arm ends and are pivotally secured thereto by means of pivot pins 92. Each link is provided with an orifice 93 which receives a rod 94. Set screws 95 having threaded engagement with suitable tapped orifices in the ends of the links 91, engage the rod 94 to rigidly secure it to the links 91. As the rod 94 connects the arms 42 and 88 associated with the wiper arms W and W' it is readily apparent that when the shaft 38 is operated through the agency of a suitable actuating knob or lever secured thereto the arm 42 is rotated and through the agency of rod 94 and links 91 which connect the arms 42 and 89 movement of the arm 42 is transmitted to the arm 89 to cause them to move in unison. A pair of stop pins 95' secured to the panel 11 limit the movement of the contact arms W and W', the stop pins 95' being engaged by the respective edges of the depending portion 50 of the arm 42.

L shaped terminals 96 and 97 are secured to the respective panels 11 and 12. The terminals 100 and 101 are integrally formed with the wipers 13, 14 and 85, 86 of the contact arms W and W'. The flexible leads 98 and 99 join the terminals 96 and 97 to the terminals 100 and 101 respectively. External conductors are secured to the L shaped terminals 96 and 97 and through the agency of the flexible leads 98 and 99 current is 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 shown but propose 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. In a device of the character described, a mounting panel, a stub shaft supported by said panel, a control shaft, a bracket secured to said panel and provided with an orifice through which said control shaft extends, a bushing secured to said stub shaft, an orifice in said bushing adapted to receive said control shaft and means adjustably supporting said bracket for aligning the said orifices in said bracket and said bushing.

2. In a device of the character described, a mounting panel, a stub shaft rotatably supported by said panel, a control shaft, a bracket secured to said panel and provided with an orifice through which said control shaft extends, a bushing secured to said stub shaft, an orifice in said bushing adapted to receive said control shaft to connect the same with said stub shaft and means adjustably supporting said bracket for aligning the said orifices in said bracket and said bushing.

3. In a device of the character described, a mounting panel, a stub shaft supported by said panel, a control shaft, a bracket secured to said panel and provided with an orifice through which said control shaft extends, a bushing secured to said stub shaft, an orifice in said bushing adapted to receive said control shaft, adjustable means for said bracket for aligning the said orifices in said bracket and bushing and a front adjustable support for said bracket.

4. In a device of the character described, a mounting panel, a stub shaft rotatably supported by said panel, a control shaft, a bracket secured to said panel and provided with an orifice through which said control shaft extends, a bushing secured to said stub shaft, an orifice in said bushing adapted to receive said control shaft to connect the same with said stub shaft, adjustable means for said bracket for aligning the said orifices in said bracket and said bushing and a front adjustable support for said bracket.

5. In a device of the character described, a mounting panel, a bearing secured to said panel, a stub shaft rotatably supported in said bearing, a control shaft, a bracket secured to said panel provided with an orifice through which said control shaft extends, a bushing secured to said stub shaft, an orifice in said bushing adapted to receive said control shaft to connect the same with said stub shaft and spring means supported on said stub shaft to take up longitudinal play of the same in said bearing.

6. In a device of the character described, a mounting panel, a plurality of contacts supported thereon, a bearing secured to said panel, a wiper and an arm, a stub shaft rotatably supported in said bearing to which said wiper and arm are secured, a control shaft, a bushing secured to said stub shaft having

an orifice therein for receiving said control shaft to connect the same with said stub shaft, and spring means supported on said stub shaft to take up longitudinal play thereof in said bearing as the said stub shaft is rotated to prevent the said wipers being moved out of their normal path as they pass over said contacts.

7. In a device of the character described, a mounting panel, a plurality of contacts supported thereon, a stub shaft rotatably supported in said bearings, a wiper and arm secured to said shaft, a control shaft, a bushing secured to said stub shaft having an orifice therein for receiving said control shaft to connect the same with said stub shaft, a washer supported on said stub shaft and fingers formed integrally therewith providing spring means to take up longitudinal play of the said stub shaft in said bearing as the same is rotated to prevent the said wiper being moved out of its normal path of travel as it passes over said contacts.

8. In a device of the character described, a mounting panel, a plurality of contacts supported thereon, a bearing secured to said panel, a stub shaft rotatably supported in said bearing, a wiper and arm secured to said shaft, a control shaft, a bracket secured to said panel provided with an orifice through which said control shaft extends, a bushing secured to said stub shaft having an orifice therein adapted to receive said control shaft to connect the same with said stub shaft, adjustable means for said bracket for aligning the said orifices in said bracket and said bushing and spring means supported on said stub shaft to take up longitudinal play thereof in said bearing to prevent said wipers from being moved out of their normal path as said stub shaft is rotated as they pass over said contacts.

9. In a device of the character described, a mounting panel, a plurality of contacts supported thereon, a rotatable shaft supported on the said panel, a wiper carried by said shaft, said wiper being adapted to engage said contacts, an arcuate member joined to said arm, a ball resting in an orifice in said bracket, said arcuate member having notches therein corresponding to said contacts, a spring secured to said bracket for pressing said ball into successive notches in said depending member as said wiper is rotated to engage successive contacts to produce a snap action and an adjustable screw engaging said spring to regulate the tension of said spring.

10. In a device of the character described, a mounting panel, a plurality of contacts supported thereon, a rotatable shaft supported on the said panel, a wiper carried by said shaft, said wiper being adapted to engage said contacts, an arcuate member being fixed to said arm, a bracket secured to said panel, a ball bearing resting in an orifice in said

bracket, an arcuate member having notches therein, a leaf spring secured to said bracket for pressing said ball bearing into successive notches in said depending member as said wiper is rotated to engage successive contacts, a screw adjustably supported by said bracket, a reduced portion on said screw and a slot in said spring receiving said reduced portion.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 4th day of September, A. D. 1928.

FRED E. FREERS.

15

20

25

30

35

40

45

50

55

60

65