T. B. MILLER.

SERIES MULTIPLE SWITCH AND CONDENSER FOR WIRELESS TELEGRAPH SYSTEMS.

APPLICATION FILED APR. 23, 1913.

1,114,626. Patented Oct. 20, 1914.

Fig. 1.

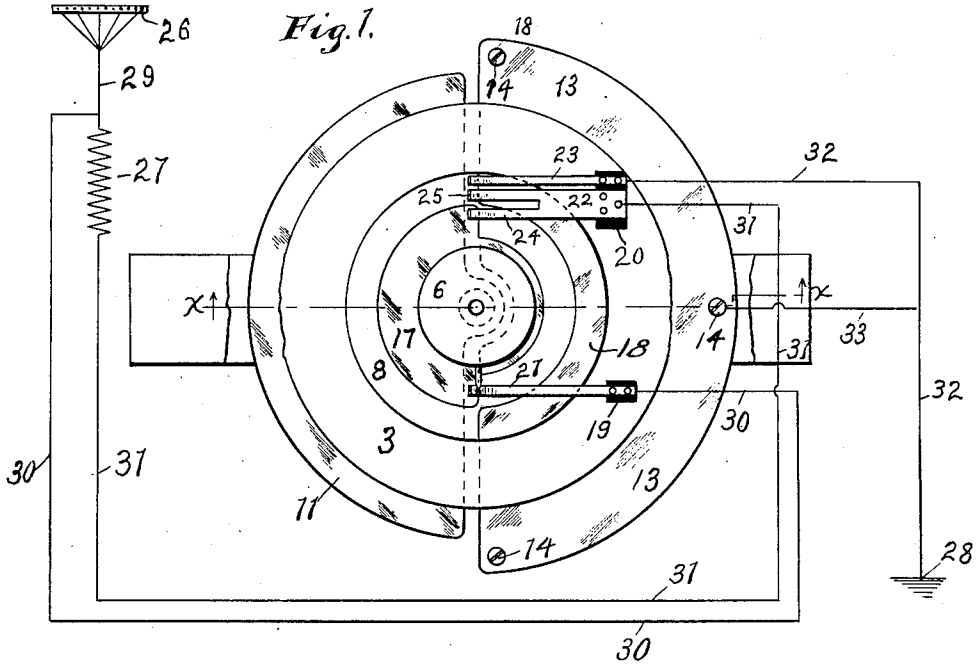
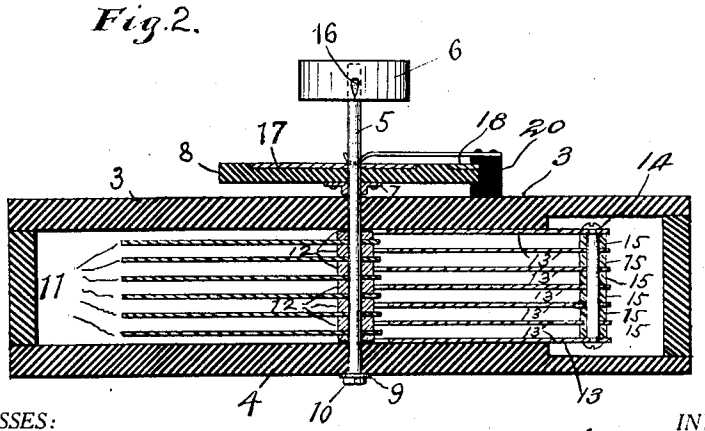


Fig. 2.



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SERIES-MULTIPLE SWITCH AND CONDENSER FOR WIRELESS-TELEGRAPH SYSTEMS.

1,114,626. Specification of Letters Patent. Patented Oct. 20, 1914.

Application filed April 23, 1913. Serial No. 763,083.

To all whom it may concern:

Be it known that I, THOMAS B. MILLER, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented a certain new and useful Improvement in Series-Multiple Switches and Condensers for Wireless-Telegraph Systems, of which the following is a specification.

My invention relates to improvements in series-multiple switches which may mechanically and electrically associated with electrical condensers having adjustably variable capacities, and which, likewise, may be associated with other kinds of translating devices; and the object of my improvement is to provide an electrical circuit changing switch mechanically and electrically combined with an electrical translating device, as with an adjustably variable condenser, whereby such translating device may be quickly switched to be connected in series, or in multiple, as may be desired, with another device or with other devices of a system of electrical circuits; but a more particular object of my improvement is to provide a series-multiple switch mechanically and electrically combined with an electrical condenser that is adjustably variable in capacity whereby the inductance of the receiving apparatus of a wireless telegraph station may be connected, in series or in multiple, as may be desired, with such condenser, between the earth and the antenna of a wireless telegraph station.

I attain these objects by devices illustrated in the accompanying drawings, wherein—

Figure 1 illustrates some of the principal parts of a structure embodying my invention by a plan view and wherein is shown diagrammatically electrical circuits associated with such parts, and Fig. 2 illustrates the same structure by a view in vertical mid-section on broken line x, x of Fig. 1.

Like reference numerals indicate like parts throughout the drawings.

Referring to the drawings, 3 represents the upper portion, and 4 represents the lower portion of a supporting frame, which portions 3 and 4 may be rigidly united by other frame portions, not shown. These frame portions 3 and 4 are made of material that is a non-conductor of electricity, as of wood or vulcanized rubber.

A shaft 5 is vertically disposed to extend downwardly through centrally located bearing holes in the frame portions 3 and 4 and adapted to be rotated therein by turning a knob 6 with one's hand. A disk 7 of metal is mounted securely on said shaft 5 with its hub bearing on the top surface of the upper frame portion 3, and concentrically mounted and fastened upon the upper side of said disk 7 is a disk 8 of vulcanized hard rubber or of other electrically non-conducting material. The hub of the disk 7 thus limits the downward movement of the shaft 5 while the upward movement of said shaft 5 is limited by a washer 9 secured on the lower end of said shaft 5 by a nut 10, the upper surface of the washer 9 engaging with the bottom surface of the lower frame portion 4. Mounted rigidly on said shaft 5 and within the space between the upper frame portion 3 and the lower frame portion 3 are a plurality of condenser plates 11, of sheet metal, and of the form of a semi-circle, the circular edges of such plates 11 registering with each other and being disposed concentrically with the shaft 5 upon which they are mounted, and between the adjacent ones of the plates 11 and between the upper one of such plates 11 and the upper frame portion 3, and between metal washers 12 are disposed on the shaft 5, one between each of adjacent plates 11, one between the upper plate 11 and the upper frame portion 3, and one between the lower plate 11 and the lower frame portion 4, as shown in Fig. 2 such washers 12 serving to space the plates 11 from each other and from the frame portions 3 and 4. Thus all these plates 11, being maintained in a fixed relation with said shaft 5 and with each other, may be rotated concentrically with said shaft 5 by turning the knob 6.

A plurality of semi-annular condenser plates 13 of like electrical conducting material are associated to register with each other by screw-bolts 14 and spaced from each other by washers 15, and in such association are disposed between the upper frame portion 3 and the lower frame portion 4 to be concentric with the shaft 5 while the spaces between the semi-circular plates 11 and the

spaces between the semi-annular plates 13 are so disposed that each of the plates 11, when the shaft 5 is rotated, may pass within the space between adjacent ones of the plates 13 without making a contact between any one of the plates 11 and any one of plates 13.

With the plates 11 and the plates 13 thus disposed if one terminal of an electric circuit be connected to the shaft 5 while the other terminal of such circuit is connected to the plate 13 then, in such case, the electrical capacity of the plates 11 and 13 would be increased or diminished in direct proportion with the degree of distance to which the plates 11 are, respectively, projected into or withdrawn from the space between the plate 13.

Since the plates 11 and 13 would be inclosed within a supporting frame I have provided a distinguishing mark or pointer 16 on the knob 6 which is disposed in a fixed and known circumferential position on said knob 6 with respect to the circumferential position of the plates 11 on shaft 5 whereby an operator may at all times know the relative position of the plates 11 and the plates 13.

Embedded concentrically within the top side of the disk 8 is a metal commutator plate 17 which is in electrical contact with the shaft 5 whereby the plates 11, the shaft 5 and said commutator plate 17 are electrically connected together, said commutator plate 17 being semi-circular in form and disposed in a circumferential position on shaft 5 that corresponds to the circumferential position of the plates 11, as shown in Fig. 1, while on the opposite half of the top side of said disk 8, and adjacent to the edge thereof is, embedded another metal commutator plate 18 of semi-annular form whose inner edge is at the same radial distance from shaft 5 as is the outer edge of the commutator plate 17.

Mounted securely upon the top side of frame portion 3 and near the outer edge of the disk 8 are blocks 19 and 20, of hard rubber or other suitable material, and upon the block 19 a metal contact spring 21 is mounted to extend its free end to a point within the path of the commutator plate 17 where it bears down on such plate 17 to make electrical contact therewith when the shaft 5 is turned to move said plate 17 in its circular path beneath said contact spring 21. In a similar manner on block 20 are separately mounted metal contact springs 22 and 23, the contact springs of 22 being bifurcated to form two spring-like members 24 and 25 while the other spring 23 is a narrower and single spring member. The spring member 24 of the spring 22, like the spring 21, is disposed in the path of the commutator plates 17 to engage therewith as such plates 17 in its rotation passes beneath the free end of said spring member 24, while the spring member 25 of said spring 22 and the contact end of the single spring 23 are disposed within the path of the commutator plate 18 both to engage in electrical contact therewith when said plate 18 is turned to move beneath them.

In the structure thus shown and described the contact springs 21, 22 and 23 and one of the screw-bolts 14 of the condenser plates 13 may each constitute one of the four electrical terminals of such structure as indicated in Fig. 1, and thus be adapted to introduce an adjustably variable electrical condenser capacity into an electric circuit in series with, or in multiple with, another translating device as with a tuning coil or inductance of a wireless telegraph system as may be required.

In Fig. 1, I have indicated diagrammatically the antenna 26 of a wireless telegraph station together with the primary coil or inductance 27 and an earth connection 28. The antenna 26 is connected by wire 29 and wire 30 to the contact spring 19 and by the wire 29 to one terminal of the inductance 27 while the other terminal of such inductance 27 is connected by wire 31 to contact spring 22, the contact spring 23 being connected to the earth connection 28 by wire 32, while the condenser plates 13 are connected by wires 33 and 32 also to earth connections 28 and the structure thus connected may be operated as follows.

If it be desired to introduce electrical condenser capacity betwen the antenna 26 and the earth connection 28 in series with the inductance 27 the knob 6 should be turned clockwise to project the condenser plates 11 between the respective condenser plates 13 to a distance to give the required capacity, whereupon induced electric waves may be conducted from the antenna 26 through wire 29 and through inductance 27, thence through wire 31 to spring 22 thence through contact member 24 to commutator plate 17 thence through shaft 5 to the condenser plates 11, thence inductively to condenser plates 13, thence through wires 33 and 32 to earth connection 28, in an obvious manner as shown by Fig. 1; but if it be desired to associate such condenser capacity in multiple with inductance 27 then, in such case, the knob 6 would be turned in a contra-clockwise direction to give a desired capacity, whereupon such Hertzian waves may flow from the antenna 26 through two paths to the earth connection 28, one of which paths would comprise the wire 29, the inductance 27, the wire 31, the contact spring 22 and its contact member 25, the commutator plate 18, the single contact spring 23 and the wire 32, while the other of such paths would comprise the wire

29, the wire 30, the contact spring 19, the commutator plate 17 the shaft 5, the condenser plates 11 and inductively to the condenser plates 13, thence to wires 33 and 32, to the earth connection 28.

Obviously the electrical capacity of the structure would be proportional to the extent to which the condenser plates 11 are projected within the space between the respective plates 13, and such structure applied to a wireless telegraph system in the manner shown in Fig. 1, would be adapted to adjust the receiving apparatus to waves of different lengths as required. Of course, a structure embodying my invention would be equally well adapted for associating electrical capacity in series or in parallel, as might be desired, with any electrical translating device in a system of electrical circuits, as well as with the inductance of a wireless telegraph station.

What I claim is:

1. In a structure of the class described, the combination with suitably supported stationary condenser plates disposed to be spaced apart and electrically connected together, of a plurality of movable condenser plates associated with said stationary condenser plates and adapted by suitable mechanism to form an adjustable condenser, a series-multiple switch associated with said mechanical means and with said movable condenser plates whereby said mechanical means may operate said switch and move said movable condenser plates.

2. In a system of electrical circuits which circuits are interposed between the antenna and the earth connections of a wireless telegraph station, the combination with an inductance coil, of an electrical condenser that is adapted to be adjustable with respect to the amount of its capacity and a series-multiple switch that is mechanically and electrically associated with said condenser by means adapted to be operated manually to vary the degree of capacity of said condenser and to switch said condenser to be connected in said circuits in parallel or in series with said inductance as may be desired.

3. In a structure of the class described, the combination with a plurality of fixed metal electrical condenser plates that are metallically connected together and so disposed that their planes are parallel each with the others, and that there shall be a space between their adjacent surfaces, of a shaft mounted to be rotatable in suitable supported bearings adjacent to the edges of said fixed condenser plate, a plurality of other metal electrical condenser plates mounted securely upon said shaft to rotate therewith and so disposed thereon with a space between adjacent ones of said plates that each of said plates on said shaft may be projected within a corresponding one of the spaces between adjacent ones of said fixed plates in response to a rotating movement of said shaft, two metallic commutator plates mounted securely on said shaft to revolve therewith one of said commutator plates being electrically insulated from said shaft while the other one is electrically connected thereto, and suitably supported and fixed electrical contact springs associated with each of said commutator plates and disposed to engage therewith when said shaft is rotated, said fixed plates and each of said contact springs being adapted for connecting wires of a system of electric circuits.

In witness whereof, I hereunto subscribe my name this 5th day of April, A. D. 1913.

THOMAS B. MILLER.

Witnesses:

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