

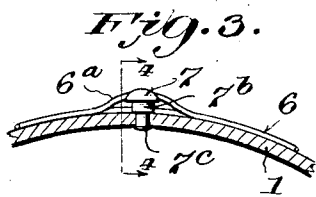
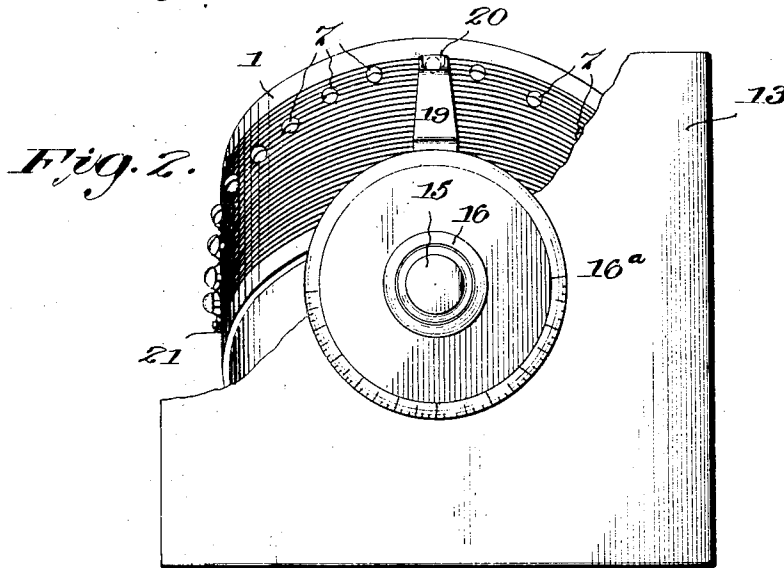
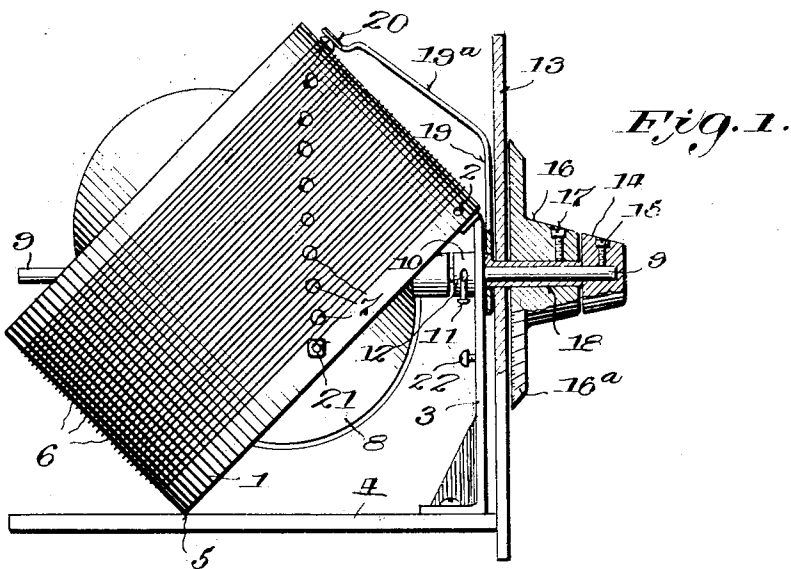
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VARIOCOUPLER

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VARIOCOUPLER.

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To all whom it may concern:

Be it known that CHARLES W. KAUTZ, JR., citizen of the United States, residing at Lancaster, in the county of Lancaster and State of Pennsylvania, has invented certain new and useful Improvements in Variocouplers, of which the following is a specification.

This invention relates to variable inductance devices such as are employed in connection with radio telegraphy, and more especially to variable inductances forming a part of apparatus known as vario-couplers.

While the invention is shown and described in connection with a vario-coupler, it will be understood that it is by no means limited to such apparatus but is capable of application to variable inductances generally.

Vario-couplers, as commonly employed, comprise a fixed member or stator on which is placed the primary winding, and a rotatable member or rotor on which is wound the secondary winding. The stator usually takes the form of a hollow cylinder, frequently mounted with its axis inclined to the horizontal, although other forms of stators are also in use.

The shaft on which the rotor is mounted extends through a board or panel and is usually provided with a knob and dial by means of which it may be adjusted. In addition to this adjustment, it is desirable to be able to vary the inductance of the primary winding itself, and to this end such winding is tapped at various points and wires are run from these taps to contact studs mounted on the board or panel. A contact arm is arranged to sweep over these studs so that any desired number of turns of the primary winding may be included in the circuit. The above is the usual arrangement now in common use, and such an arrangement necessitates the boring of a large number of holes in the panel to receive the contact studs, and the running and connecting of a number of wires extending from these studs to the primary winding taps.

The primary object of the present invention is to provide means by which the inductance of the primary winding may be varied without the necessity of mounting contact studs upon a panel board, or, in other words, to provide a self contained va-

riable inductance unit in the mounting of which it is only necessary to bore a single hole in the panel, such hole being for the passage of the rotor shaft.

To this end, I pivotally mount concentrically with the rotor shaft, and preferably journaled upon it, a contact arm constructed and arranged to sweep over the primary winding and engage contact elements supported by the stator itself and associated directly with the primary winding, whereby the use of auxiliary studs and connecting wires is avoided.

In order that the invention may be readily understood, reference is had to the accompanying drawing, forming part of this specification, and in which:—

Fig. 1 is a side elevation of a vario-coupler embodying my improvements, parts being shown in section;

Fig. 2 is a front elevation thereof, parts being broken away;

Fig. 3 is an enlarged fragmentary section through the stator, taken parallel with the primary winding;

Fig. 4 is a section substantially on the line 3—3 of Fig. 3, looking in the direction of the arrows; and

Fig. 5 is a fragmentary development on an enlarged scale, showing the arrangement of contact studs relative to the stator winding, the heads of the studs, and portions of the winding being broken away.

Referring to the drawings in detail, 1 designates the stator member which, as shown, consists of a hollow cylindrical shell supported in an inclined position by means of a bracket 3 to which it is secured by screws 2, the bracket being mounted upon a suitable base 4. The lower edge of the stator member also rests upon the base 4 as indicated at 5.

The primary winding is shown at 6, and this is arranged as usual in the form of a layer of insulated wire wound circumferentially around the cylindrical support. It is quite possible, within the broader aspects of my invention, to have the contact arm mounted as hereinafter described, directly engage and travel over this primary winding layer, after the manner of the ordinary rectilinear slide devices in common use, the insulation being scraped off of the winding 6

in the path of movement of the contact arm. However, I prefer to slightly elevate certain of the convolutions of the winding at separated points, and arrange the contact arm to engage these elevated portions of the chosen convolutions.

Various means for elevating the desired convolutions may be employed, as, for example, by placing a small strip or block of insulating material beneath them. I have found, however, that a convenient and efficient way of accomplishing the end in view is to elevate the convolutions by means of metallic studs set into the support on which the wire is wound.

Referring to the drawings, it will be seen that I provide a series of studs 7, each having a round head as shown, provided with a kerf 7^a, after the manner of an ordinary screw. Each stud has a flattened shank 7^b, terminating in a round projection or pin 7^c, the end of the flattened shank forming shoulders at each side of such pin. Small holes are drilled in the shell to receive these pins, which are inserted until the shoulders engage, and the ends of the pins are then upset and riveted in, as clearly shown in Fig. 3. These studs are set into the cylinder at the desired points before the primary winding is put on, and as it is wound the convolutions lying in the planes of the studs are carried up and over the heads thereof in such a manner that they enter and lie in the notches or kerfs, as clearly shown in Figs. 3 and 4. It will be understood, of course, that the insulation is removed from the wire at the point where it engages the stud heads so that electrical contact with the studs is made. The wire may be large enough to substantially fill the kerf and even project slightly above the top of the head, or it may be of such size as to lie wholly within the kerf below the upper edge thereof. In the first case, the contact arm hereinafter described will engage the elevated portions of the wire itself where it passes over the stud heads, and in the second case, it will engage the stud heads themselves. In either case, an electrical connection is established with the convolutions of the winding by the contact arm.

Referring to Fig. 5, it will be seen that the relatively thin, wide shanks 7^b of the studs 7 pass between the adjacent convolutions of the winding, such convolutions being parallel with the greatest dimension of the shanks, while the convolution between the two which lie at each side passes up over the top of the stud head, as described. The thickness of the stud shanks is preferably only slightly greater than the diameter of the wires, so that each stud shank occupies substantially the same space as the convolution of wire which is elevated thereby.

By reference to Figs. 1 and 2, it will be

seen that the studs or screws 7 are arranged in a series around the surface of the supporting cylinder in such a way as to define a curved line, and preferably extend through an arc of approximately 180°.

While, of course, any desired number of studs can be employed, I find that highly satisfactory results can be obtained by using as many studs as are required to provide a tap for every second turn or convolution. The studs are disposed symmetrically on each side of the center of the series, the arrangement preferably being such that consecutive turns connect with studs disposed alternately at opposite sides of the series. Thus, referring to Fig. 5, the center or top-most stud engages the first convolution; the first stud on the right engages the third convolution; the first stud on the left engages the fifth convolution, and so on. In this way, four turns or convolutions lie between adjacent studs, but every second turn engages a stud on one side or the other.

The rotor is designated at 8 and may be of any usual construction. It is mounted upon a shaft 9 which is journaled at one end in the bracket 3 and at the other end in a bearing (not shown) carried by the stator 1. A boss 10 is carried by the bracket 3 and is provided with a slot 12 extending approximately 180°, and in this slot works a stop pin 11 projecting from the shaft 9. This is for the purpose of limiting the angular movement of the rotor.

The shaft 9 extends through the bracket 3 and also through the panel board 13, and carries at its extreme end a knob 14 secured thereto by means of a set screw 15. By manipulating this knob, the rotor may be adjusted in the usual manner.

Surrounding the projecting end of the shaft 9, and journaled freely thereon, is a sleeve 18, which extends inwardly through the panel board and has secured to its inner end, preferably at a point between the panel board and bracket 3, a contact arm 19. This arm extends for some distance parallel with the panel board, and is then bent over inwardly, as indicated at 19^a, until its free end 20 is in position to engage the contact studs 7. A knob 16 preferably having a dial 16^a is secured to the sleeve 18, as by means of a set screw 17, and by manipulating this knob, the sleeve 18, and with it the arm 19, may be rotated about the shaft 9, so as to cause the free end 20 of the contact arm to sweep over and successively engage the contact studs, thus establishing electrical connection with different convolutions of the primary winding.

The series of studs is preferably so arranged as to conform as nearly as possible to the arc of a circle, but any slight variation from a true arc is taken care of by making the arm 19 resilient, so that it may

yield, as required. This resiliency is made possible by reason of the bend 19^a formed therein.

21 indicates the connection for the aerial, and 22 the ground connection or binding post, and it will be understood that moving the contact arm around through 180° will vary step-by-step the number of turns of the primary winding included in the circuit. The dial 16^a may be graduated to indicate the number of turns, or in any other desired way.

While I have shown my improvements as applied to a winding carried on a cylindrical support, it will be understood that it may be applied also to windings mounted upon spherical or other supports having either a flat or curved surface. The gist of the invention consists in causing the contact arm to describe a curved path substantially conforming to the contour of that portion of the support over which it travels.

What I claim is:—

1. A variable inductance comprising a cylindrical support, a conductor wound therearound, and a contact arm pivotally mounted independently of said support on an axis inclined to the axis of the support but lying in the same plane, and arranged to swing around a portion of said support so as to establish electrical connection with said conductor at any one of a plurality of points.

2. A variable inductance comprising a cylindrical support, a conductor wound thereon in the form of a single layer, and a contact arm pivotally mounted on an axis inclined to that of the said support but lying in the same plane, and arranged to swing over the surface of said layer so as to establish electrical connection with said conductor at any one of a plurality of points.

3. A variable inductance comprising a support having a curved surface, a conductor wound in a layer on said surface, contact studs set into the curved surface of said sup-

port between some convolutions of said conductor, and in direct contact with other convolutions thereof, and a contact arm mounted independently of said support and arranged to selectively engage said studs.

4. A variable inductance comprising a support having a curved surface, a conductor wound in a layer on said surface, contact studs set into said support in a curved line and in engagement with certain convolutions of said conductor, and a contact arm mounted independently of said support and arranged to travel over and engage said studs.

5. A variable inductance comprising a support having a curved surface, a conductor wound in a layer on said surface, a series of contact studs, each having a head provided with a notch or kerf, set into said support, certain convolutions of the conductor lying in the kerf of said stud heads and thus making electrical contact therewith and a contact arm arranged to travel over and engage said series of screws.

6. A variable inductance comprising a cylindrical support mounted in an inclined position, a conductor wound on said support in a layer, and a contact arm mounted on a horizontal axis disposed in the same plane as the axis of the cylinder and arranged to swing over the surface of said layer so as to establish electrical connection with said conductor at any one of a plurality of points.

7. A var'io-coupler comprising a fixed primary member including a support having a curved surface, and a rotatable secondary member, a conductor wound in a layer on the surface of said support, and a contact arm pivoted to swing about the same axis as that on which said secondary member is mounted and arranged to travel over the surface of said layer and establish electrical connection with said conductor at any one of a plurality of points.

In testimony whereof I affix my signature.

CHARLES W. KAUTZ, JR.