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A. ONWOOD

MOUNTING FOR INDUCTANCE COILS

Filed May 10, 1923

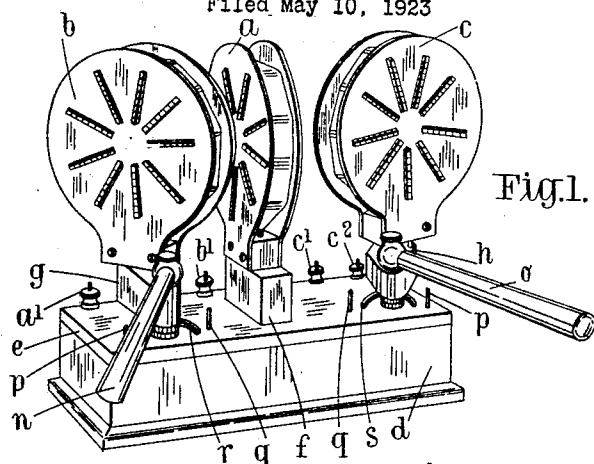


Fig. 1.

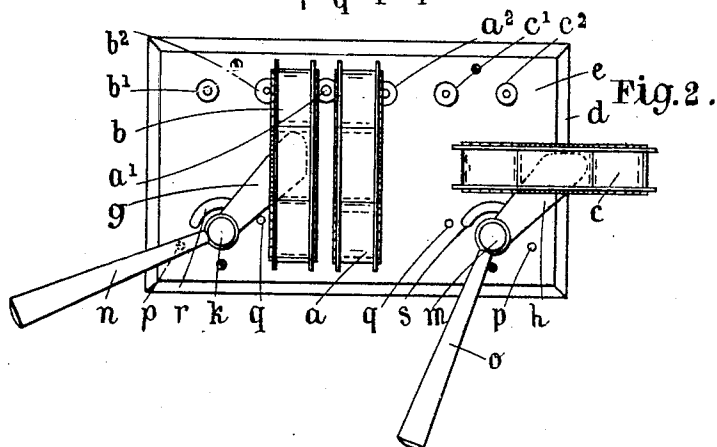


Fig. 2.

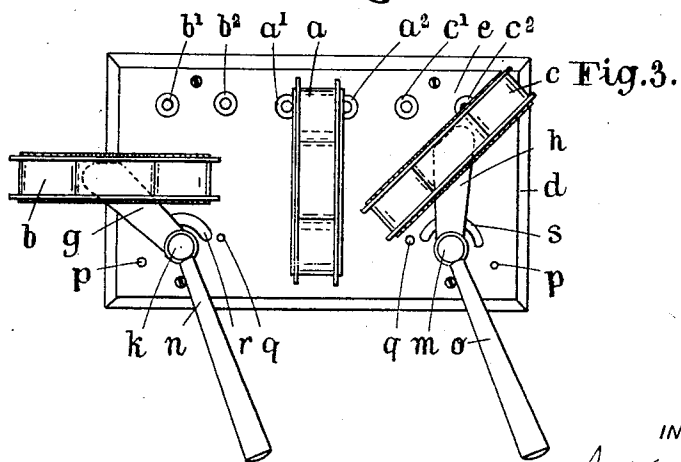


Fig. 3.

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UNITED STATES PATENT OFFICE.

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MOUNTING FOR INDUCTANCE COILS.

Application filed May 10, 1923. Serial No. 638,075.

To all whom it may concern:

Be it known that I, ANDRE ONWOOD, a British subject, and resident of 30 Hambleton Road, Southfields, London, S. W. 18, England, have invented certain new and useful Improvements in Mountings for Inductance Coils (for which I have filed an application in England, dated 21st June, 1922), of which the following is a specification.

This invention relates to apparatus for wireless signalling and like purposes and particularly to the mounting of coupling coils and other inductance coils.

In wireless receiving apparatus it is often necessary to provide a tuning inductance in circuit with the aerial, a further inductance in the secondary circuit coupled with the aerial and also a reaction coil coupled with the other two coils. It is often desirable to mount all of these coils in a removable manner, so that when the range of wave lengths has to be changed these coils can be replaced by other interchangeable coils of different inductance. Provision usually has to be made for varying the degree of coupling between these coils and the arrangement most often used hitherto for this purpose has been to hinge the coils together by means of a hinge arranged substantially in the plane of the adjacent faces of the two coils, in order to enable the coils to be adjusted from a relatively parallel position to a position relatively at right angles. When the coils are parallel the coupling is a maximum, but when they are moved into the position at right angles permitted by such an arrangement, the coupling is by no means reduced to zero; frequently it is only reduced to about 50 per cent of the maximum value. Owing to this fact with such systems it is often difficult to tune out from interfering transmitting stations.

It is one of the main objects of the present invention, therefore, to mount such coils so that the coupling can be varied from a maximum value to substantially zero and for this purpose according to the invention, one coil is arranged to be fixed and the other coil is pivotally mounted so that it can be turned from a position close beside the fixed coil and parallel thereto in which the degree of coupling is a maximum into a position in which the degree of coupling has a zero or even a negative value. It is

convenient to arrange the moving coil so that it can be turned into a position at right angles to the fixed coil with its mid plane coincident with the axis of the fixed coil, so that, in the latter position, the coupling is substantially zero.

In practice it is preferred to mount the moving coil or coils on the end of a pivoted arm which is arranged so that when the two coils are parallel the angle between its central plane and the central plane of the fixed coil is made equal to 45 degrees. For this result the movable coil has to be set obliquely on the arm so that its central plane is inclined 45 degrees to the central plane of the arm. By turning the arm by means of a suitable handle through an angle of 90 degrees the moving coil takes up a position at right angles to the fixed coil and with its central plane passing through the axis of the fixed coil and in this position there is practically no coupling between the two coils. It is convenient to arrange two such coils, one on each side of the fixed coil and it is often necessary to make all three of these coils removable. A fixed coil may, for example, be plugged into a socket on the fixed base and the moving coils each plugged into an insulating socket on its own pivoted arm.

In order that the invention may be clearly understood and readily carried into effect, it will be further described as applied to a three coil arrangement in connection with the accompanying drawings, in which:—

Figure 1 is a perspective view of the three coils and their mountings;

Figure 2 is a plan of the same, and

Figure 3 is a further plan showing the coupling between the fixed coil and the two movable coils altered.

In these drawings *a* is the fixed coil and it has a moving coil *b* and *c* one on each side of it. Such an arrangement is useful in wireless telegraphy receiving instruments where, for example, the coil *a* may be the tuning inductance in the secondary closed circuit, the coil *b* the aerial tuning inductance and the coil *c* the usual reaction coil intended to be connected in the anode circuit of one of the thermionic valves of the receiving instrument in the usual manner. The coils are shown mounted in a shallow box *d* with an ebonite top *e*. The central coil *a* is shown detachably mounted on an insulating socket *f*. For this purpose

it is furnished with two terminal pins (not shown) which engage in conducting sockets in the base *f*.

The coils *b* and *c* are mounted on pivoted arms *g*, *h* respectively of insulating material, these coils also being detachably mounted by means of terminal pins and sockets, as in the case of the fixed coil *a*. The arms *g* and *h* are arranged with their central planes inclined at angles of 45 degrees to the central planes of the coils *b* and *c* respectively as can be seen clearly in Figures 2 and 3. The pivots of the arms *g* and *h* are seen at *k* and *m*. Theoretically, the pivots *k*, *m*, should lie in line with the outer edges of the coils *a*, *b*, *c* when the latter are all close together and parallel but, as shown, the pivots are placed slightly within these lines. By means of this arrangement, the arms *g* and *h* are slightly shortened and the whole apparatus is made rather more compact. The only disadvantage is that when either of the moving coils is turned from the position of coil *b* in Figure 2 during the first movement the edge of the coil tends to move slightly towards the fixed coil, which means that the coils can not approach as closely as they might otherwise. The adjusting arms *n* and *o* which are of insulating material, preferably of ebonite, are secured to the pivots *k*, *m* and are long enough so that no capacity effects of practical importance are introduced by the hand of the operator in turning the coils. The coil *b* in Figure 2 is shown in the position of maximum coupling with the central plane of the arm *g* at an angle of 45 degrees to the central plane of the fixed coil *a*. In Figure 2 the coil *c* is shown in the position of minimum coupling and in Figure 3 the coil *b* has been moved to the corresponding position, while in that figure the coil *c* is shown in an intermediate position. The arms *g* and *h* co-act with stop pins *p* and *q* which allow the coils *b* and *c* to be turned parallel to the coil *a* in one extreme position and in the other extreme position allow the coils to pass slightly beyond the position of zero coupling, so that a negative coupling of a small magnitude can be obtained. The three coils are illustrated with terminals *b'*, *b''*, *a'*, *a''*, *c'*, *c''* respectively. In order to enable the moving coils to be connected to their terminals, the arms *g* and *h* each have a spring strip brush fixed to their under-sides and bearing upon a contact segment *r*, *s*; the other terminal may be connected through the pivot spindles *k*, *m*.

As shown, the arms *g*, *h* are arranged with their central vertical planes inclined at 45 degrees to the central planes of the coils *b*, *c* respectively. It is possible, however, to mount the coils on their arms at a different angle. If the angle is less than 45 de-

grees, the coil has to be turned from the position of maximum coupling through an angle greater than a right angle to reach the position of zero coupling. Similarly, if the angle is greater than 45 degrees, the coil has to be turned through an angle less than a right angle to be moved from the position of maximum coupling into the position of zero coupling.

With the three coils mounted as shown and with independent terminals, it is clear that they may be used in a wireless telegraphy receiver of the coupled type with reaction coupling as already mentioned, but it is clear that such coils may be used as a variometer or variable inductance, although usually in such a case only one moving coil will be necessary and in that case the moving coil and fixed coil would be connected in series or parallel as the case may be. The coils illustrated in the drawing are high efficiency coils as set forth and claimed in my patent application Serial No. 620,095 filed 19th February 1923, but it is clear that the invention can also be employed in conjunction with any other form of inductance coil.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a mounting for inductance coils, a support, a coil holder fixed thereto and adapted to carry a fixed coil, a pivot mounted on said support with its axis parallel to the plane of said fixed coil and a movable coil holder mounted to turn about said pivot and adapted to carry a movable coil disposed so that the planes of its faces always remain parallel to those of said fixed coil and also disposed so that said pivot lies substantially out of the plane of said moving coil.

2. A mounting for inductance coils including a supporting base, a coil holder fixed thereto, a fixed coil carried by said coil holder, a pivot mounted on said base with its axis parallel to the planes of the faces of said fixed coil, a movable coil holder mounted to turn about said pivot and a movable coil rigidly carried by said movable coil holder in such a position that said pivot lies substantially out of the plane of said movable coil.

3. In a mounting for inductance coils, the combination of a support, a coil holder fixed thereto and adapted to carry a fixed coil, a pivot mounted on said support and lying with its axis parallel to the plane of said fixed coil and a movable coil holder mounted to turn about said pivot and adapted to carry a movable coil in such a position that said pivot lies substantially out of the plane of said movable coil, said movable coil holder being capable of free movement to move said movable coil from a position

parallel to and beside said fixed coil to a position at right angles to and lying in the axis of said fixed coil.

4. In a mounting for inductance coils a support, a pivot upstanding therefrom, a coil holder fixed on said support, terminals carried by said coil holder adapted to maintain a fixed coil detachably in a plane parallel to the axis of said pivot, a movable coil holder mounted to turn about said pivot and terminals carried by said movable coil holder adapted to secure detachably a movable coil in such a position that the axis of said pivot lies substantially external to the planes of said movable coil.

5. A mounting for inductance coils including a supporting base, a coil holder fixed thereto, a fixed coil carried by said coil holder, a pivot mounted on said base to lie parallel to the plane of said fixed coil but substantially out of said plane, a movable arm mounted to turn about said pivot and a movable coil carried by said arm with its plane inclined to the central axis of said arm.

6. A mounting for inductance coils including a supporting base, a coil holder fixed thereto, a fixed coil removably attached to said coil holder by conductive plug and socket connection, a pivot mounted on said base to lie parallel to the plane of said fixed coil but substantially out of said plane, a movable arm mounted to turn about said pivot and a movable coil attached by said arm by conductive plug and socket connection so that its plane is inclined to the central axis of said arm.

7. In a mounting for inductance coils a support, a coil holder fixed thereto, a pair of pivots mounted on said support to lie on opposite sides of the plane of the fixed coil but parallel to said plane and a pair of movable coil holders, each mounted to turn about its respective pivot and each adapted to support a movable coil in such position that the respective pivot lies substantially out of the plane of the said movable coil.

8. A mounting for inductance coils including a supporting base, a coil holder fixed thereto, a fixed coil carried by said coil holder, a pivot mounted on said base, to lie substantially out of the plane of said fixed coil but parallel to said plane, a pivotal arm mounted to turn about said pivot, an insulating operating handle operatively connected with said arm to turn therewith and a movable coil carried by said arm.

9. A mounting for inductance coils including a supporting base, a coil holder

fixed thereto, a fixed coil removably attached to said coil holder by conductive plug and socket connection, a pivot mounted on said base to lie parallel to the plane of said fixed coil but substantially out of said plane, a movable arm mounted to turn about said pivot and a movable coil attached by said arm by conductive plug and socket connection so that its plane is inclined to the central axis of said arm at an angle of substantially 45 degrees.

10. In a mounting for inductance coils a support, a supporting base, a coil holder fixed thereto, a pair of parallel socket terminals mounted in said coil holder, a pivot mounted on said base to lie parallel to the plane passing through said socket terminals, a movable coil holder mounted to turn about said pivot and a pair of parallel socket terminals mounted in said movable coil holder in such position that said pivot lies substantially out of the plane passing through said last-mentioned socket terminals.

11. In a mounting for inductance coils a fixed support, a coil holder fixed thereto, a fixed coil rigidly carried by said coil holder, a pivot mounted upon said support, a movable coil holder mounted to turn about said pivot and a movable coil rigidly carried by said movable coil holder in such a position relatively to said pivot that the latter is parallel to the planes of the faces of said moving coil but is situated substantially to one side of the space lying between these planes and substantially to one side of the axis of said moving coil, said pivot also being located so that during the turning movement of the moving coil the latter moves from a position of maximum coupling close beside the fixed coil and parallel thereto into a position in which the coupling between the said two coils has a relatively negligible value.

12. A mounting for inductance coils including a supporting base, a coil holder fixed thereto, a fixed coil carried by said coil holder, a pivot mounted on said base situated substantially to one side of the space lying between the planes of the faces of said fixed coil, a movable coil holder mounted to turn about said pivot, a movable coil carried by said movable coil holder and a relatively long operating arm of insulating material mounted also to turn about said pivot and clamped to said movable coil holder.

In witness whereof, I hereunto subscribe my name this 30th day of April, A. D. 1923.

ANDRE ONWOOD.