June 5, 1934. F. M. FREDERIKSEN 1,961,874

COIL COUPLER FOR RADIO RECEIVING APPARATUS

Filed June 8, 1932

Fig. 1

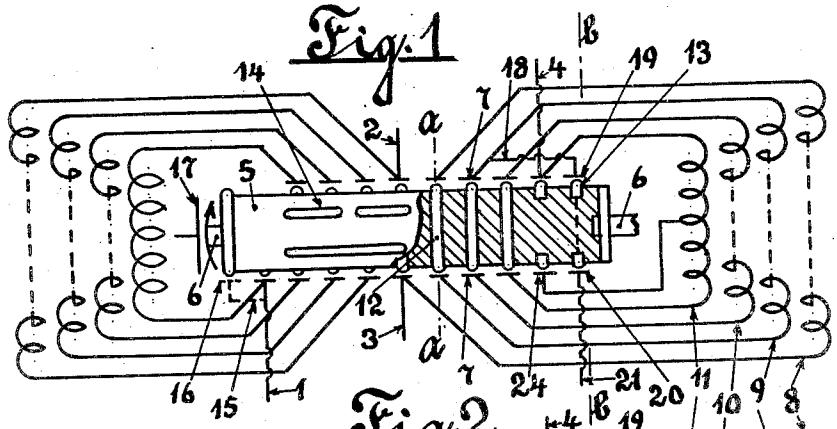


Fig. 2

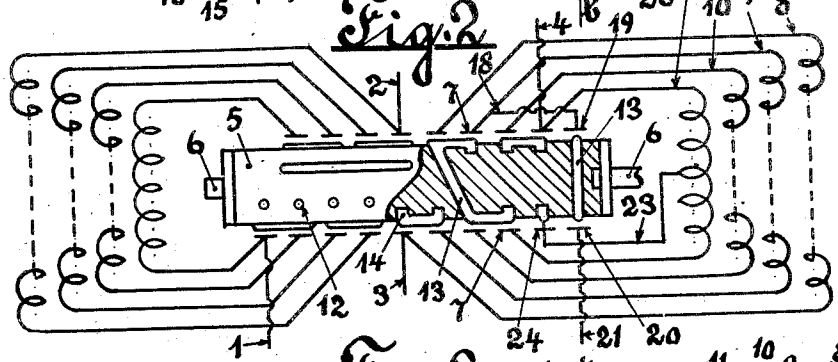


Fig. 3

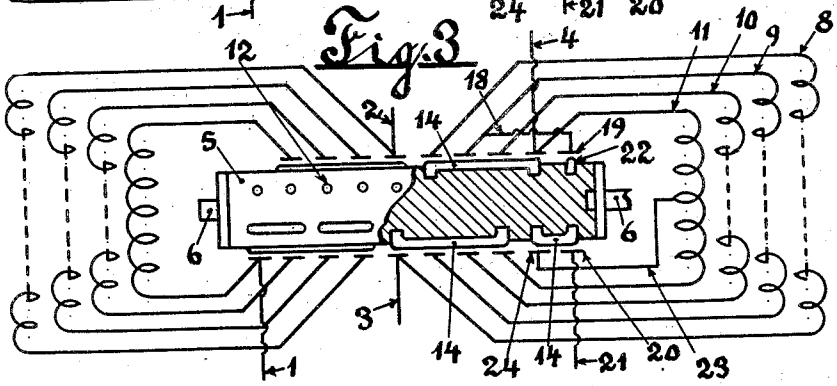


Fig. 4

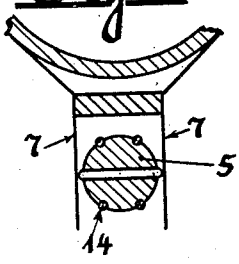
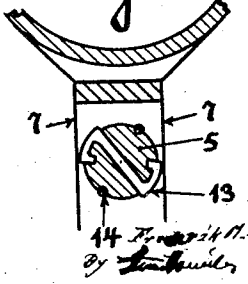


Fig. 5



Inventor:
F. M. Frederiksen
By [illegible], Attorney.

Patented June 5, 1934 1,961,874

UNITED STATES PATENT OFFICE

1,961,874

COIL COUPLER FOR RADIO RECEIVING APPARATUS

Frederik Marius Frederiksen, Skorping, Denmark

Application June 8, 1932, Serial No. 616,151
In Denmark September 3, 1931

3 Claims. (Cl. 171—119)

For tuning radio receiving apparatus to wave lengths between 200 and 2000 meters, the present range of radiophony, use is made of variable condensers. If a condenser having an area of 450 centimeters is used, the number of windings of an associated inductance coil should be varied from 60 to about 260.

In some of the apparatus hitherto known two coils are used, one for long and one for short waves, and the apparatus is then provided with a commutator. This arrangement involves a drawback, as an apparatus with only two coils cannot be adjusted to all lengths of waves between 200 and 2000 meters.

This drawback has been evaded in the present invention, which relates to a coil coupler for radio receivers, in which several sets of coil windings can be coupled together in series, in parallel, and both in series and in parallel, by means of which it will always be possible to adjust the number of windings exactly to the wave length wanted without putting off or short-circuiting any part of the coil.

An object of this invention is to provide a device for changing the inductive coupling in a radio tuning circuit.

Another object of this invention is to devise a structure for changing the connections between a group of coils from series to parallel or to series parallel.

In the drawing:

Figures 1, 2 and 3 show a coil coupler according to the invention in top view and partly cut through in positions for long, medium and short lengths of waves, respectively.

Fig. 4 shows a section on the line *a*—*a* in Fig. 1.

Fig. 5 shows a section on the line *b*—*b* in Fig. 1.

The form of construction for a coil coupler shown consists of a drum 5 of non-conducting material which, by means of pivots 6, is rotatably mounted in bearings, not shown in the drawing, so that the drum can be rotated between two series of contact springs 7 to which the windings of the coils are fixed. These coils are marked 8, 9, 10 and 11. Through the drum 5 is inserted a series of pins 12 (Fig. 1) and straps 13 (Fig. 2) of conducting material. Rails 14 (Figs. 2 and 3), also of conducting material, are inserted in the surface of the drum.

When the drum is in the position shown in Fig. 1, the pins 12 form electric conducting connections between two contact springs 7 placed opposite to each other, by means of which all of the coils 8–11 are joined up in series, which must take place when operating with long waves. When the drum is rotated to the position shown in Fig. 2, pairs of contact springs 7, placed beside each other, are in touch with the same bar or rail 14 and pairs of the coils are connected in parallel. The several pairs of parallelly connected coils are joined up in series by means of the straps 13 extending between opposite rails 14. This position is used for medium waves. If, finally, the drum is rotated to the position shown in Fig. 3, all of the contact springs 7 placed at one side, to which the coils are connected, contact with a single long rail or bar 14, and all of the contact springs 7 of the other side, which are also in connection with the coils, contact with a similar opposite bar or rail 14. Thus, all of the coils are joined up in parallel for the purpose of receiving short waves.

The form of construction for a coil coupler shown in the drawing and described above is intended to be used in connection with a double coil transformer, but the invention can also be arranged for a single coil and for a transformer with a separate back-coupling coil.

By means of electric conducting lines 1, 2, 3 and 4, the coil coupler is connected with the rest of the apparatus to antenna, ground, negative filament and grid, respectively. In Fig. 1, it is shown how the line 1 through a line 15 is connected with a contact spring 16, which is in electric conducting connection with one of the pivots 6 of the drum 5, which then at the same time forms a shaft for the rotor of a rotary condenser, the stator of which is 17, to which the antenna can then be connected.

Several operations require extraction from the center of the coil. This is obtained in the form of construction shown by connecting one end of the coil 9 to a line 18 with a contact spring 19 which, in the couplings shown in Figs. 1 and 2, is in electric conducting connection through a strap 13 with another contact spring 20, which is connected with a line 21, through which the extraction is made.

In the coupling shown in Fig. 3, where all of the coils are joined up in parallel, the contact spring 19 touches a button 22, which is not in electric conducting connection with any other contact spring. In this case the extraction is made through a line 23, which connects the center of a desired set of windings with a contact spring 24, which together with the contact spring 20 touches the same rail or bar 14.

In the form of construction shown, four sets of windings are on each side of the transformer, but of course any other desirable number of sets of windings can be used.

The sections connected to the left and right halves of the barrel in Figs. 1, 2 and 3 represent the secondary and primary sides of a transformer, respectively, so that the center extraction can be used either for neutrodyne stabilization or as antenna connection. If the coil coupler is to be used in rice-neutrodynes, the left half will be the primary and the right half with center extraction the secondary side. If an extra antenna connection is desirable here too, both halves of the transformer can be provided with center extractions.

The coil coupler can also be used for recoupling of a single coil, variable self-induction, tuned anode, in which case only one half of the barrel with its associated springs is required. The other half can then be used for the recoupling of an associated back coupling coil.

Figs. 4 and 5 show the cross-section of a possible form of construction for the coil coupler, the upper hatched part showing the cross-section of the connected coil, while the lower part shows springs and barrel.

An essential advantage of the coil coupler described is that all of the windings connected with the coupler are in use for every wave length within the distance of wave length of the coil in question. Thereby it will be possible to evade change of coils in short wave apparatus (under 200 meters).

I claim as my invention:—

1. A coil coupler for radio receiving apparatus comprising a plurality of coils, a rotary drum of insulating material, a plurality of diametrically-arranged contact elements associated with the drum, the ends of each coil being connected to a diametrically-positioned pair of said contact elements, a plurality of plugs extending through one diameter of the drum for conductively connecting opposed pairs of contact elements so that the coils are serially connected, a plurality of diametrically-opposed bars positioned on the surface of the drum on another diameter thereof, each of said bars being of a length to connect all of the contact elements on one side of the drum to conductively connect all of the coils in parallel, a second set of bars diametrically-positioned on still another diameter of the drum and being of a length to connect alternate pairs of contact elements together, and plugs extending through the drum to connect opposed pairs of said last-mentioned bars to serially connect the parallelly connected pairs of coils.

2. A coil coupler for radio receiving apparatus comprising a plurality of coils, a rotary drum of insulating material, a plurality of diametrically-arranged contact elements associated with the drum, the ends of each coil being connected to a diametrically-positioned pair of said contact elements, a plurality of plugs extending through one diameter of the drum for conductively connecting opposed pairs of contact elements so that the coils are serially connected, a plurality of diametrically-opposed bars positioned on the surface of the drum on another diameter thereof, each of said bars being of a length to connect all of the contact elements on one side of the drum to conductively connect all of the coils in parallel, a second set of bars diametrically-positioned on still another diameter of the drum and being of a length to connect alternate pairs of contact elements together, plugs extending through the drum to connect opposed pairs of said last-mentioned bars to serially connect the parallelly connected pairs of coils, and means for making an extraction from the center of the winding comprising a contact element engaging the drum, means carried by the drum for connecting said last-mentioned contact element with the central portion of the winding regardless of the type of connection between the coils of the winding.

3. A coil coupler for radio receiving apparatus comprising a plurality of coils forming one winding of the coupler, a rotary drum of insulating material, a plurality of diametrically-arranged contact elements associated with the drum, the ends of each coil being connected to a diametrically-positioned pair of said contact elements, a plurality of plugs extending through one diameter of the drum for conductively connecting opposed pairs of contact elements so that the coils are serially connected, a plurality of diametrically-opposed bars positioned on the surface of the drum on another diameter thereof, each of said bars being of a length to connect all of the contact elements on one side of the drum to conductively connect all of the coils in parallel, a second set of bars diametrically-positioned on still another diameter of the drum and being of a length to connect alternate pairs of contact elements together, plugs extending through the drum to connect opposed pairs of said last-mentioned bars to serially connect the parallelly connected pairs of coils, a second set of coils forming the other winding of the coupler, contact elements connected to ends thereof and engaging said drum, and means carried by the drum for connecting the coils of the second winding in series, parallel and series parallel simultaneously with the coils of the first-recited winding.

FREDERIK MARIUS FREDERIKSEN.