

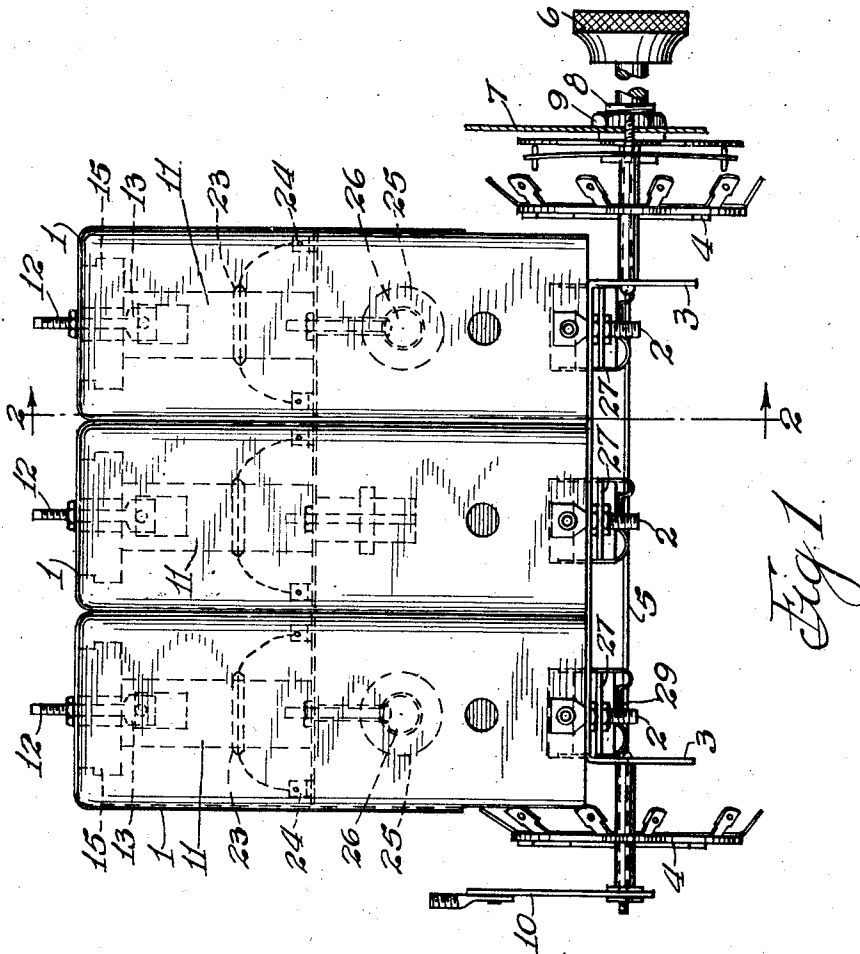
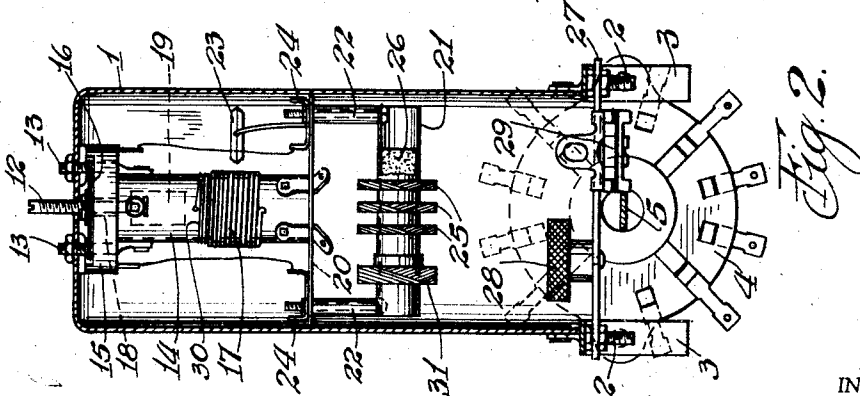
Nov. 8, 1938.

W. J. POLYDOROFF, ET AL

2,135,841

HIGH FREQUENCY COIL

Filed Feb. 10, 1936



INVENTORS.
WLADIMIR J. POLYDOROFF.
DWIGHT V. SINNINGER.
BY
Clemens H. Vig,
ATTORNEY.

UNITED STATES PATENT OFFICE

2,135,841

HIGH-FREQUENCY COIL

Wladimir J. Polydoroff, Wilmette, and Dwight V. Sinninger, Chicago, Ill., assignors to Johnson Laboratories, Inc., Chicago, Ill., a corporation of Illinois.

Application February 10, 1936, Serial No. 63,100

3 Claims. (Cl. 250-40)

The invention relates to high-frequency coupling devices suitable for use in radio receivers, and more particularly to such devices for use in receivers intended for the reception of several bands of frequencies.

When the circuits are tuned by variable capacitors, the desired spectrum of frequencies usually is divided into several bands, depending on the range of variability of the variable capacitors. It is practical to employ variable tuning capacitors having a capacitance range between 10 and 450 micromicrofarads, which, in parallel with the initial capacitance of the circuit and vacuum tubes, will cover a range of frequencies having a maximum ratio of about 3.

An object of the invention is to provide a highly efficient coil system for use in multiple-band receivers of either the tuned radio-frequency or superheterodyne type. Another object of the invention is to provide means for equalizing the performance of several coil systems which are simultaneously tuned. A further object of the invention is to provide a compact and fully shielded coil system readily adapted for mounting in a radio receiver.

The invention will be better understood by reference to the accompanying drawing, in which:

Fig. 1 is an elevation of a group consisting of three coil systems according to the invention, and

Fig. 2 is a section taken on the line 2-2 of Fig. 1.

In the embodiment of the invention shown in the drawing and described herein, each coil system includes three coils, arranged to cover three frequency bands, as follows: the "long-wave" band from 140 to 410 kilocycles; the "standard broadcast" band from 540 to 1700 kilocycles; and the "short-wave" band from 5.5 to 18 megacycles. It will be understood that it is within the scope of the invention to arrange the coils to have a different frequency coverage, either with respect to the number of frequency bands or with respect to the frequencies included in each band.

Referring to Fig. 1, shield cans 1 are mounted by means of spade bolts 2 on metal strips 3, which also support switch sections 4 at either end. The switch sections 4 are operated simultaneously by shaft 5, which carries knob 6. The shield can and switch section assembly is secured to the chassis 7 of the radio receiver or other apparatus in which it is a component part by means of threaded bushing 8 and nut 9. Further support may be provided by securing arm 10 to another portion of chassis 7, not shown. Each shield can

1 supports from its upper closed end a coil and trimmer capacitor assembly 11, the upper end of each can 1 being provided with holes to receive coil adjusting screws 12 and to permit access to the trimmer capacitors.

If the device of Fig. 1 is to be employed in a tuned radio-frequency receiver, the three assemblies 11 are identical. For use in superheterodyne receivers, however, one of the assemblies 11 may be different from the others and employed in conjunction with the oscillator system of the receiver. In Fig. 1, the middle unit is intended for this purpose. The leads from the assemblies 11 are brought out to the terminal lugs of switch sections 4, so that the whole assembly is compact and self-supporting, and may be assembled and tested before being installed in the radio receiver of which it is to form a component part. Furthermore, each assembly 11 is thoroughly shielded both from the other assemblies and from other component parts of the receiver.

Referring to Fig. 2, spade bolts 13 are attached to coil form 14 and pass through insulating base 15, which carries two adjustable trimmer capacitors 16. The short-wave coil 17 having a primary winding 30 is wound on the coil form 14. Coil 17 preferably consists of a single layer of a solid insulated conductor. Centrally located in insulating base 15 is a threaded bushing 18 adapted to receive adjusting screw 12, to the lower end of which is attached a small pellet of magnetic material 19. Rotation of screw 12 produces displacement of the pellet 19 with respect to the coil 17, thus permitting the inductance of the coil to be varied over a limited range.

At its lower end, coil form 14 has attached to it a disc or plate of insulating material 20, from which is suspended coil form 21 by means of spacer bolts 22. Plate 20 may also support auxiliary apparatus, such as for example fixed capacitor 23 and terminal lugs 24. On coil form 21 is wound the sectionalized broadcast secondary coil 25, which is provided with a finely comminuted ferromagnetic core 26, and a primary winding 31. Coil 25 is preferably wound with Litz wire, which consists of a number of individually insulated strands. One trimmer capacitor 16 is connected in shunt with coil 25 and one in shunt with coil 17.

The spade bolts 2 also hold in place insulating strip 27, which supports long-wave coil 28 and its trimmer capacitor 29, which is readily adjustable from below. Ample space is provided at either side of strip 27 for the leads from the trim-

mer capacitors 16 and the terminals 24 to the switch sections 4, so that a compact and efficient assembly of the three coils and their trimmer capacitors is obtained.

- 5 In operation, the position of pellet 19 is adjusted until coil 17 has the proper inductance at the low-frequency end of the short-wave band of frequencies. Then the trimmer capacitor 16 which shunts coil 17 is adjusted at the high-frequency end of the short-wave band. In this way, 10 coil 17 need be only approximately of the correct initial inductance with a resultant substantial saving in the cost of manufacture. The trimmer capacitors in shunt with the broadcast and long-wave coils, respectively, are adjusted at the high-frequency ends of the frequency bands which each of these coils is intended to cover, in the usual manner.

- One of the features of the invention is the provision of simple and inexpensive means for compensating for slight variations in the short-wave coils and in the length and position of their connecting leads, thus substantially improving the performance when several coil systems are simultaneously tuned by means of a multiple-gang variable capacitor. Thus the necessity for great care and uniformity in the manufacture of the short-wave coils is no longer essential for satisfactory performance, and the results are not inherently dependent upon the chance positioning and lengths of the connecting leads.

Having thus described our invention, what we claim is:

1. A multiple-band coil system for use in high-frequency resonant circuits, including an open-ended shield can containing and supporting a first coil having an adjustable magnetic body, a second coil having a fixed ferromagnetic core

mounted at right angles to said first coil and trimmer capacitors associated with said first and second coils, and a third coil and associated trimmer capacitor mounted in the open end of said shield can.

2. A multiple-band coil system for use in high-frequency resonant circuits, including in combination, a multiple-section band-selecting gang switch, a plurality of shield cans, means for mounting said shield cans as a unit with said gang switch, each of said shield cans containing and supporting a first coil having an adjustable magnetic body, a second coil having a fixed ferromagnetic core mounted at right angles to said first coil and trimmer capacitors associated with said first and second coils, and a third coil and associated trimmer capacitor mounted in the open end of each of said shield cans.

3. A multiple-band coil system for use in high-frequency resonant circuits, including in combination, a multiple-section band-selecting gang switch, a plurality of open-ended shield cans, means for mounting said shield cans as a unit with said gang switch, each of said shield cans containing and supporting a first coil having an adjustable magnetic body to vary the inductance thereof, a second coil having a fixed ferromagnetic core and mounted with its axis at right angles to the axis of said first coil and intersecting the axis of said first coil externally of said first coil, trimmer capacitors associated with said first and second coils, and connections from said gang switch to said coils, the sections of said gang switch being mounted upon said shield cans and adjacent the open ends thereof in such manner as to minimize the length of said connections.

WLADIMIR J. POLYDOROFF.
DWIGHT V. SINNINGER.