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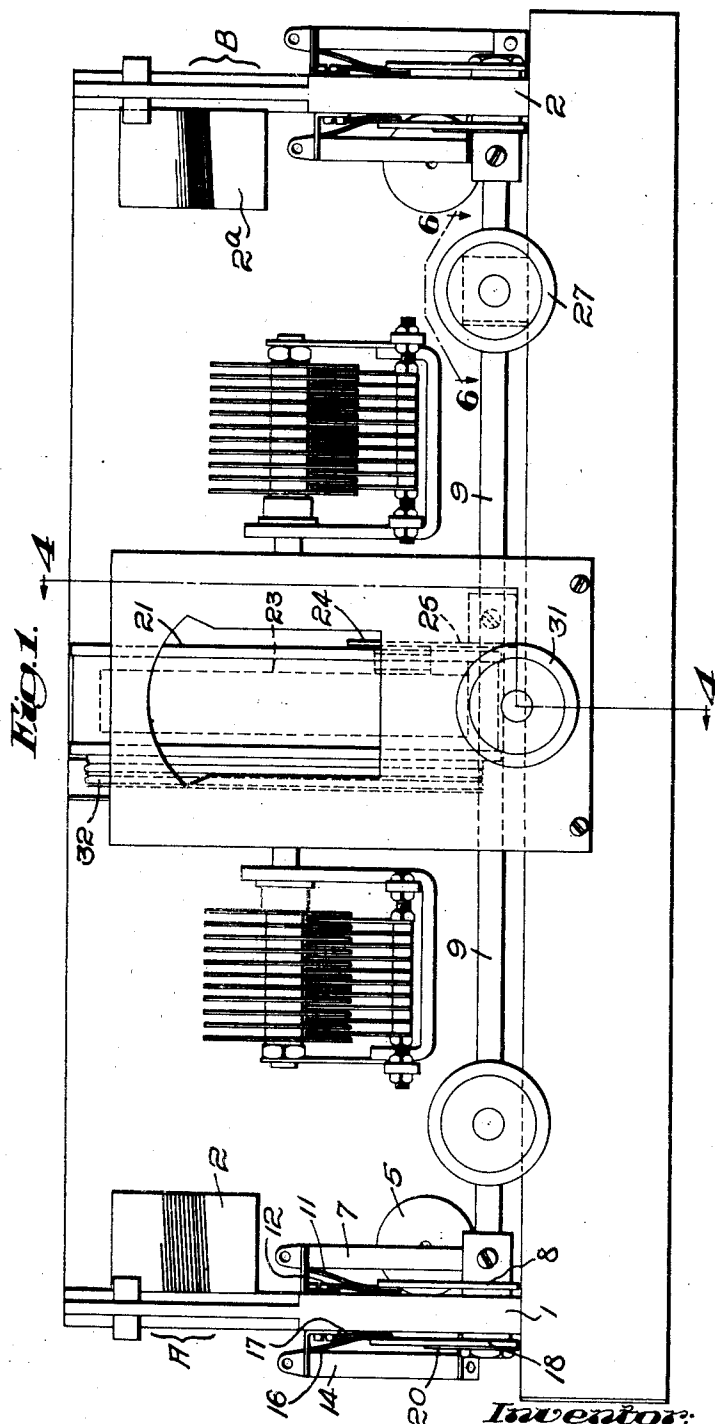
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1,982,751

COIL SELECTING AND INDICATING MEANS FOR SHORT WAVE RADIO APPARATUS

Filed Nov. 28, 1931

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

Fig. 2.

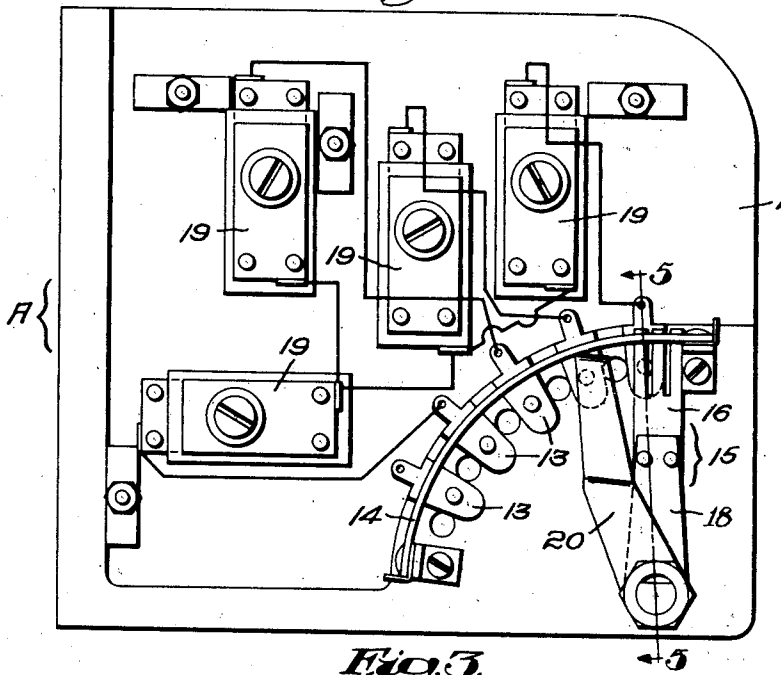
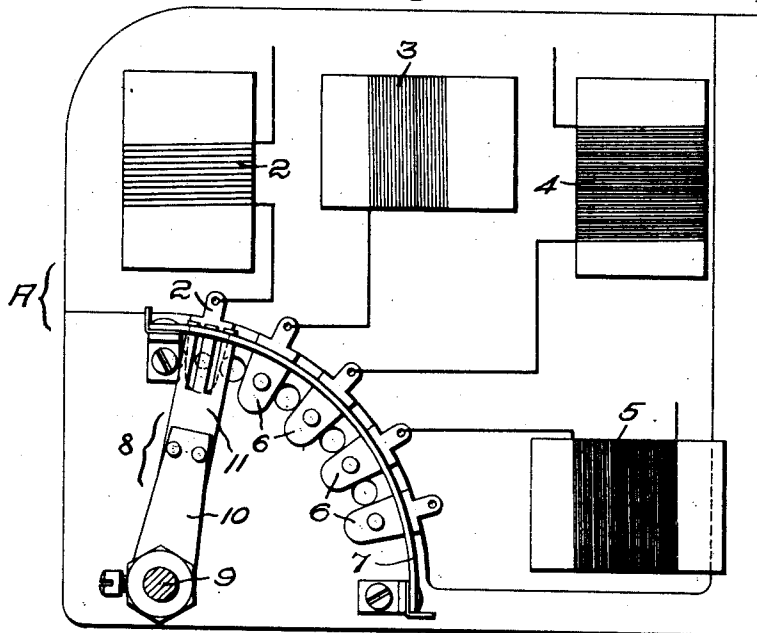


Fig. 3.



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4 Sheets-Sheet 3

Fig. 4.

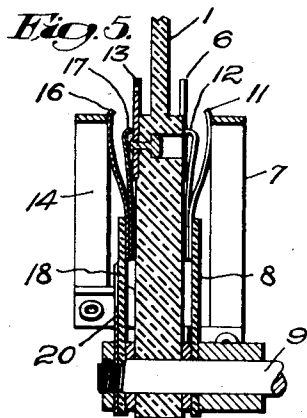
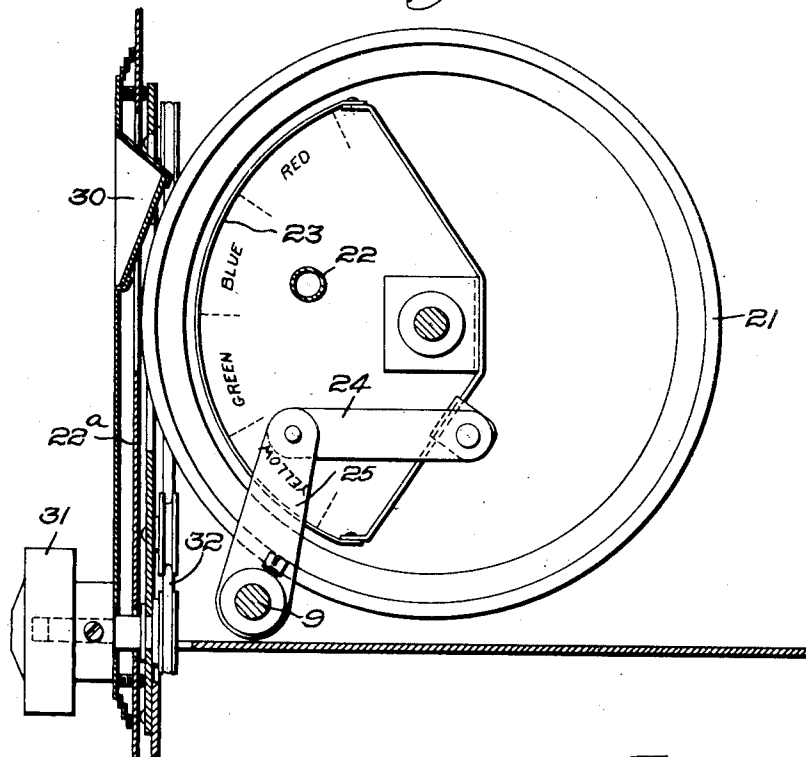
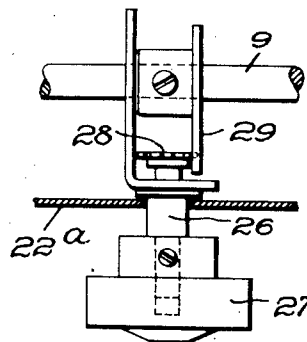


Fig. 6.



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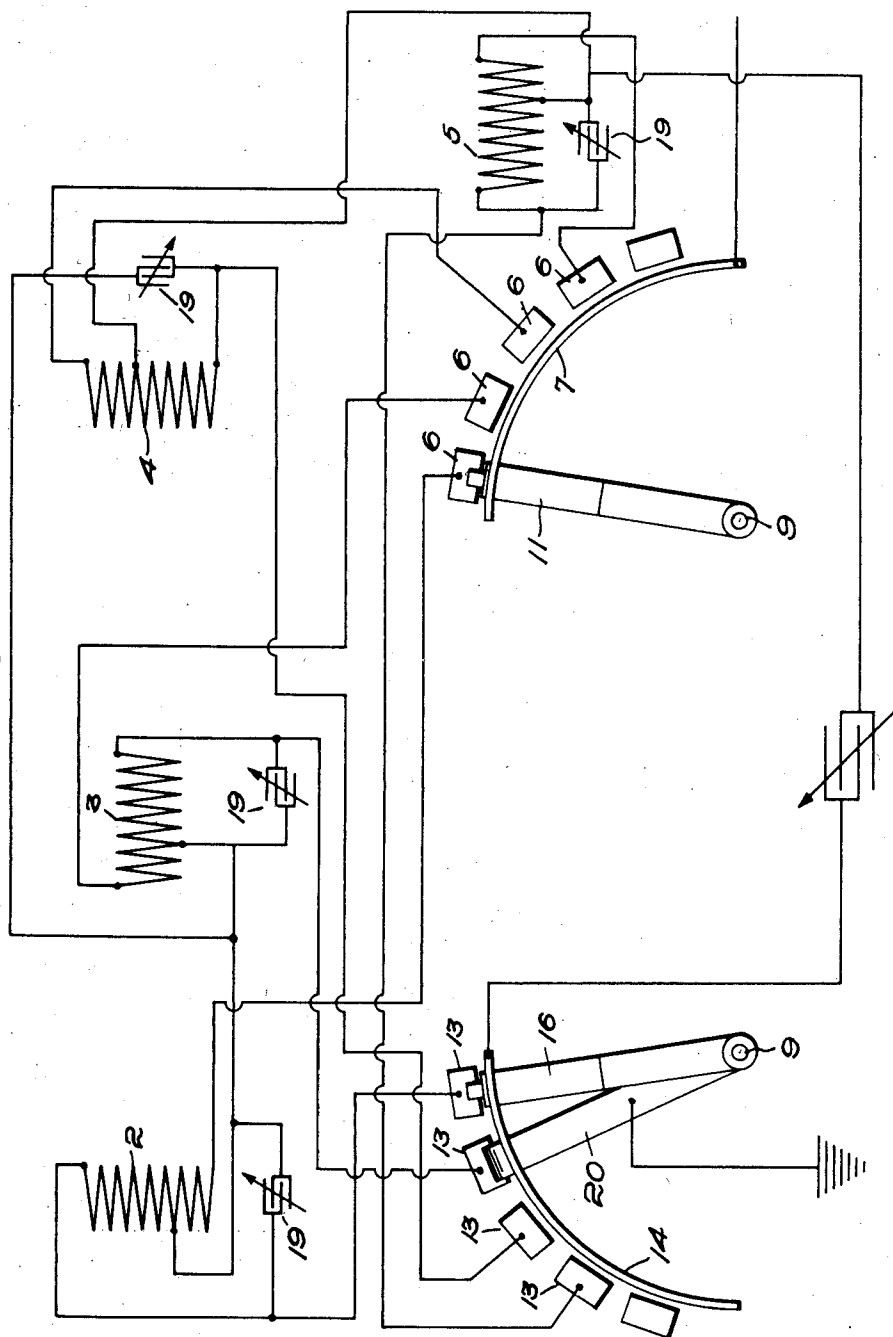
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COIL SELECTING AND INDICATING MEANS FOR SHORT WAVE RADIO APPARATUS

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4 Sheets-Sheet 4

Fig. 2.



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UNITED STATES PATENT OFFICE

1,982,751

COIL SELECTING AND INDICATING MEANS
FOR SHORT WAVE RADIO APPARATUS

James Millen, Malden, Mass.

Application November 28, 1931, Serial No. 577,789

8 Claims. (Cl. 250—40)

My invention aims to provide improvements in radio sets and more particularly improvements in so-called short wave radio receivers.

In the drawings which illustrate a preferred embodiment of my invention:—

Figure 1 is a front view of a short wave radio receiver, the panel being omitted to expose those parts which are involved in my invention;

Fig. 2 is a side elevation of one of the two units which support the coils, trimmer condensers and switch mechanism;

Fig. 3 is an elevation view of the opposite side of the panel shown in Fig. 2;

Fig. 4 is a section taken on the line 4—4 of Figure 1 showing the dial mechanism and the associated color screen;

Fig. 5 is a section taken on the line 5—5 of Fig. 2 to show the switch mechanism;

Fig. 6 is a detail plan view of the switch-operating means taken on the line 6—6 of Figure 1; and

Fig. 7 is a diagrammatic view of the parts carried by the panel A, the wiring connections thereof and an associated variable condenser.

Referring now to the particular embodiment of my invention illustrated by the drawings, I have shown a so-called short wave radio receiving set adapted for operation without the necessity of using plug-in coils. It is well known to those skilled in the art that it is common practice to use coils in sets of two in connection with short wave broadcasting reception and that each set of coils is adapted for use only for a given range of frequencies, these ranges of frequencies commonly overlapping as will be understood by those skilled in the art.

My improved short wave radio set contemplates the use of a number of pairs of coils, permanently fixed as a part of the set, in combination with a simple means whereby any desired pair of coils may be readily and quickly selected for use as a part of the set in connection with receiving signals. I have also provided a simple and convenient unit structure which will be more fully hereinafter described.

In the particular radio set illustrated by the annexed drawings I have shown two panels for supporting the coils and associated parts as complete units A and B. Since each unit is substantially identical it will be necessary to describe in detail only one of them. The unit which I shall select for detailed description is shown at the left-hand side of Figure 1. This unit includes a panel structure 1 preferably made from insulating material. At the inner face of

the panel 1 I have rigidly attached four coils 2, 3, 4 and 5, each capable of use in connection with the reception and reproduction of a given range of broadcast signals. As shown, the axes of adjacent coils are at right angles to each other to minimize straight coupling between the coils. At both the inner and the outer faces of the panel 1 I have arranged a switch structure which is adapted to be operated in such a manner as to connect any one of the coils into the remainder of the circuit of the set.

At the inner face of the supporting structure (Fig. 3) I have attached a series of contact members 6 which are arranged in an arc and connected by suitable lead wires, as shown, to the various coils 2, 3, 4 and 5. I have also shown an arc-shaped contact member 7 which is attached to the panel 1 and is spaced laterally outwardly from the contact members 6. This arc-shaped contact member 7 is made long enough to span all of the contact members 6. In connection with the contact members 6 and 7 I have provided a movable switch arm 8 which is attached to a rod 9 extending from the unit A to the unit B and mounted therein for reciprocation relative thereto. The movable switch arm 8 comprises a part 10 made of insulating material, a spring-like finger 11 made of an electrical conducting material and adapted to bear at all times against the contact member 7. I also provide a finger 12 (Fig. 5) adapted to bear against the contact members 6 as the switch arm is moved relative thereto. As a result of this arrangement any desired part of the radio apparatus may be connected through the contact 7 to any one of the coils because the fingers 11 and 12 are connected to each other and, therefore, make a connection between the contact member 7 and any one of the contact members 6 with which the finger 12 may be in contact, as shown in Fig. 5.

At the other side of the panel 1 I have provided a switch structure which is substantially identical with the one just described and which includes contact members 13, an arc-shaped contact member 14, a switch arm 15 connected to the shaft 9 and movable contact-engaging fingers 16 and 17 carried by an insulating portion 18 and adapted to contact with the members 14 and 13 respectively.

The panel structure 1 supports several compression type trimmer condensers 19 (Fig. 2) which are adapted to be adjusted for the purposes well known to those skilled in the art. These condensers are connected in the usual

manner by suitable wires (Fig. 7) into the various circuits with the coils. The coils, condensers and switches carried by the panel A are shown in a schematic layout by Fig. 7 as is also the ground connection with the arm 20 and with a variable condenser or other suitable instrument with which the coils and trimmer condenser are adapted to be associated.

From the above description it will be apparent that all of the devices which are to be assembled with the panel structure as a unit may be easily and quickly assembled and interconnected by suitable wiring before the panel is positioned in the set. Thereafter it is necessary to connect only the trimmer condensers 19 and the arc-shaped contact members 7 and 14 with the remainder of the elements in the set circuit.

I have found that an ordinary switching arrangement for the coils 2, 3, 4 and 5 is not satisfactory because one of the associated coils will have a natural period which is such that it will come within the range of a coil which is connected in for operation. As a result there is a "dead spot" and the reception of signals broadcast on a wavelength which would come within the "dead spot" are cut off. It will, of course, be apparent that such interference is undesirable and, therefore, should be eliminated. I have found that I can arrange the coils in relatively compact relation and at the same time eliminate interference by grounding that coil which would have a natural period coming within the range of the coil in use. This is very easily accomplished by the use of an additional contact arm 20 (Fig. 2) which is associated with the arm 15 and moves in conjunction therewith. This arm 20 is made of conducting material and is grounded through the rod 9 which may be connected to ground through the chassis of the set. The switch arm 20 contacts with the next succeeding contact 13 engaged by the finger 17 and grounds the coil connected to that contact.

The radio receiver illustrated includes a well known type of drum dial 21 (Fig. 1) which is illuminated by an electric light bulb 22 (Fig. 4) so that the markings on the scale may be visible from the front of the panel 22^a (Figs. 4 and 6) of the radio receiver. Since it is desirable to have some visible means whereby the operator may know which set of coils is operating in the circuit, I have provided a color screen 23 which is divided into sections of various colors (Fig. 4) and which is operable with the switch means so that each set of coils will be identified by some particular color. The color screen 23 is connected by a suitable linkage, comprising the links 24 and 25, to the shaft 9 so that it may be operated in positive conjunction with the switch means.

Any suitable mechanism may be used to reciprocate the shaft 9. However, I have shown in Fig. 6 a shaft 26 extending through the panel of the radio set and having a bearing in a part secured to the base plate of the set. At the inner end of the shaft 26 I have provided a pinion which meshes with a segment attached to the shaft 9. A knob is attached to the shaft 26 and located at the other side of the panel of the radio set and is adapted when turned to move the switch mechanism on each of the units A and B and also the color screen.

The operation of the apparatus described above may be described as follows: Assuming, for instance, that coil 2 secured to the panel A and coil 2^a secured to the panel B provide the pair, which are used in connection with the rest

of the apparatus illustrated for reception of signals broadcast over a range from fourteen to twenty-five meters, then those coils must be connected into the circuit of the receiver to receive signals within that range. By manipulation of the knob 27 (Figs. 1 and 6) the pinion 28 meshes with the segment 29 (Fig. 6), thereby rotating the shaft 9 connected to the switch arms 10 and 18. The knob 27 is rotated until the finger 12 contacts with that contact 6 which is connected by suitable wires to the coil 2. At the same time the finger 17 contacts with another contact member at the opposite side of the panel 1 (Fig. 2), which contact member is also connected by suitable wiring (Fig. 7) to the coil 2. The coil 2 is electrically connected through the contact member 13 with the contact member 14 by means of the fingers 16 and 17, as clearly shown in Fig. 5. The coil is also connected from a contact member 6 to the contact member 7 by means of the fingers 10 and 11, as also shown in Fig. 5. The contact members 7 and 14 are suitably connected by wiring (not shown) to the other electrical element of the set as will be well understood by those skilled in the art.

Since I have already described the manner in which the coil 2 is connected to the contact members 7 and 14 which are connected to the circuit of the set in a suitable manner and since the coil 2^a is also connected into the circuit by the use of contact members and switch arms substantially identical with those described in connection with coil 2, it is unnecessary to describe in detail the operation of the switch mechanism in connection with coil 2^a.

The other coils mounted on the panels 1 and 1^a are out of operation when the coils 2 and 2^a are connected as just described. However, any one of these other coils and in fact any pair of coils may be connected into the set in the same manner as coils 2 and 2^a by simply turning the knob 27, thereby to move the contact-engaging fingers 10 and 17 to engage with other contact members 6 and 13 respectively while the fingers 11 and 16 are making sliding contact with the contact members 7 and 14.

It is, of course, understood that each pair of coils covers a predetermined range of signals. Therefore, one of the other coils on each unit will have a natural period which would come within the range of the signals adapted to be received by the coils 2 and 2^a. The natural period of these coils would interfere with the operation of the coils 2 and 2^a in such a manner as to cause a "dead" spot at which no signals would be audible. To eliminate the interference I have provided, as above described, a contact arm 20 associated with each of the units A and B. These contact arms 20, one of which is shown in Fig. 2, ground one of the contact members 13 of each of the units thereby grounding the coil which is connected to the contact member 13. In this manner interference between coils is satisfactorily eliminated.

In order that the operator of the receiver may know which set of coils is connected by the switches, I have provided the color screen 23 which is divided off into colored sections, as indicated in Fig. 4. This color screen 23 is located inside the drum type dial 21 and between the electric lamp 22 and the scale on the dial. Since the color screen 23 is connected by the links 24 and 25 to the shaft 9 it may be reciprocated within the dial 21 by rotation of the knob 27. Each set of coils is represented by the color

of the screen 23, which color is brought opposite the opening in the escutcheon plate 30 secured to the panel 22^a of the receiver, as shown in Fig. 4. Therefore, that portion of the scale which is visible through the aperture in the escutcheon plate shows the color of the screen which is between the aperture and the lamp 22. The dial 21 is operated independently of the screen and the switch mechanism by rotation of the knob 31 connected by the well known flexible drive 32 with the drum 21.

While I have illustrated and described a preferred embodiment of my invention, I do not wish to be limited thereby, because the scope of my invention is best defined by the following claims.

I claim:—

1. In a radio set a plurality of coils each adapted for use in connection with the tuning of the set over a different range of signals, and a switch device operable selectively to connect and disconnect each coil as desired for operation as a part of the set and selectively to ground that coil which would have a natural period interfering with the coil in operation unless grounded.

2. In a radio set a tuning condenser, an assembled unit for use in connection with introducing any one of several coils into circuit with said tuning condenser, said assembled unit comprising a panel, a plurality of coils secured directly to said panel, a plurality of trimmer condensers attached to said panel and connected by suitable wiring in circuit with said coils and a switch mechanism also mounted upon said panel and suitably connected by wiring to said coils and trimmer condensers and adapted to connect any one of said coils and associated trimmer condensers into the circuit with said tuning condenser as desired.

3. In a radio set an assembled unit for use in connection with introducing any one of several coils into operative relation with the other electrical units of the set, said assembled unit comprising a panel, a plurality of coils secured directly to said panel, a plurality of trimmer condensers attached to said panel and connected by suitable wiring in circuit with said coils and a switch mechanism also mounted upon said panel and suitably connected by wiring to said coils and trimmer condensers and adapted selectively to connect any one of said coils and associated trimmer condensers into the circuit of the set as desired and selectively to ground that coil which would have a natural period interfering with the coil in operation unless grounded.

4. In a radio set a pair of tuning condensers, an assembled unit for use in connection with introducing any one of several coils into circuit with one of said tuning condensers, said assembled unit comprising a panel, a plurality of coils secured directly to said panel, a plurality of trimmer condensers attached to said panel and connected by suitable wiring in circuit with said coils and a switch mechanism also mounted upon said panel and suitably connected by wiring to said coils and trimmer condensers and adapted to connect any one of said coils and associated trimmer condensers into circuit with said tuning condensers as desired, another similar assembled unit provided as a part of the set the coils of which unit are tuned by the other of said tuning condensers, and a single switch-operating means connecting both switch mechanisms of the said units whereby they are

operated in conjunction with each other to introduce a predetermined coil of each unit into circuit with said tuning condensers as desired.

5. In a radio set, a plurality of coils each adapted for use in connection with the tuning of the set over a given range of signals, a switch device operable to connect and disconnect each coil as desired for operation as a part of the set and means operable to ground that coil which would have a natural period interfering with the coil in operation unless grounded, said switch device including a plurality of spaced contacts adapted to be connected by suitable wiring to the coils and a single contact extending over all of the spaced contacts in spaced relation thereto and a switch arm having means adapted to engage one of the first mentioned contact members and the second mentioned contact member whereby any one of said first mentioned contact members may be electrically connected to the second contact member, and said grounding means comprising an arm movable with the switch arm and adapted to make a grounded connection with one of the first mentioned contact members which is out of contact with the switch arm.

6. In a radio set, an assembled unit for use in connection with introducing any one of several coils into operative relation with the other electrical units of the set, said assembled unit comprising a panel, a plurality of coils secured directly to said panel, a switch mechanism also connected to said panel and adapted to connect any one of said coils into the circuit as desired, said switch mechanism including a plurality of spaced contacts adapted to be connected by suitable wiring to the coils and a single contact extending over all of the spaced contacts in spaced relation thereto and a switch arm having means adapted to engage one of the first mentioned contact members and the second mentioned contact member whereby any one of said first mentioned contact members may be electrically connected to the second contact member, and grounding means comprising an arm movable with the switch arm and adapted to make a grounded connection with one of the first mentioned contact members which is out of contact with the switch arm.

7. In a radio set, an assembled unit for use in connection with introducing any one of several coils into operative relation with the other electrical units of the set, said assembled unit comprising a panel, a plurality of coils secured directly to said panel, a switch mechanism also connected to said panel and adapted to connect any one of said coils into the circuit as desired, said switch mechanism comprising at one side of the panel a plurality of spaced contacts adapted to be connected by suitable wiring to the coils on that panel and a single contact extending over all of the spaced contacts and in spaced relation thereto and a pivoted switch arm having means adapted to engage one of the first mentioned contact members and also the second mentioned contact member whereby any one of said first mentioned contact members may be electrically connected to the second contact member and a similar series of spaced contact members and a single contact member and also a switch arm pivotally connected to the first mentioned switch arm and located at the opposite side of the panel for the purposes described and grounding means comprising an arm connected for movement with

one of the switch arms at one side of said panel and adapted to make a grounded connection with one of the first mentioned contact members, thereby to ground the coil connected to that contact member.

8. In a radio set, a plurality of spaced tuning units; each unit having a plurality of coils, supporting means for holding said coils in spaced relation, and switch means for placing a selected coil of the unit into circuit; each of said switch means comprising a pair of rows of contacts the contacts of which are severally connected to said coils, and a pair of switch arms for selecting

simultaneously one contact of each pair of rows of contacts for selectively connecting coils of the associated unit into circuit, each of said switch means also comprising a third switch arm movable with said pair of switch arms for contacting with a different contact of one of said rows from the contacts contacted by said pair of switch arms for grounding a coil which would have a natural period interfering with the coil connected into circuit by said pair of switch arms.

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