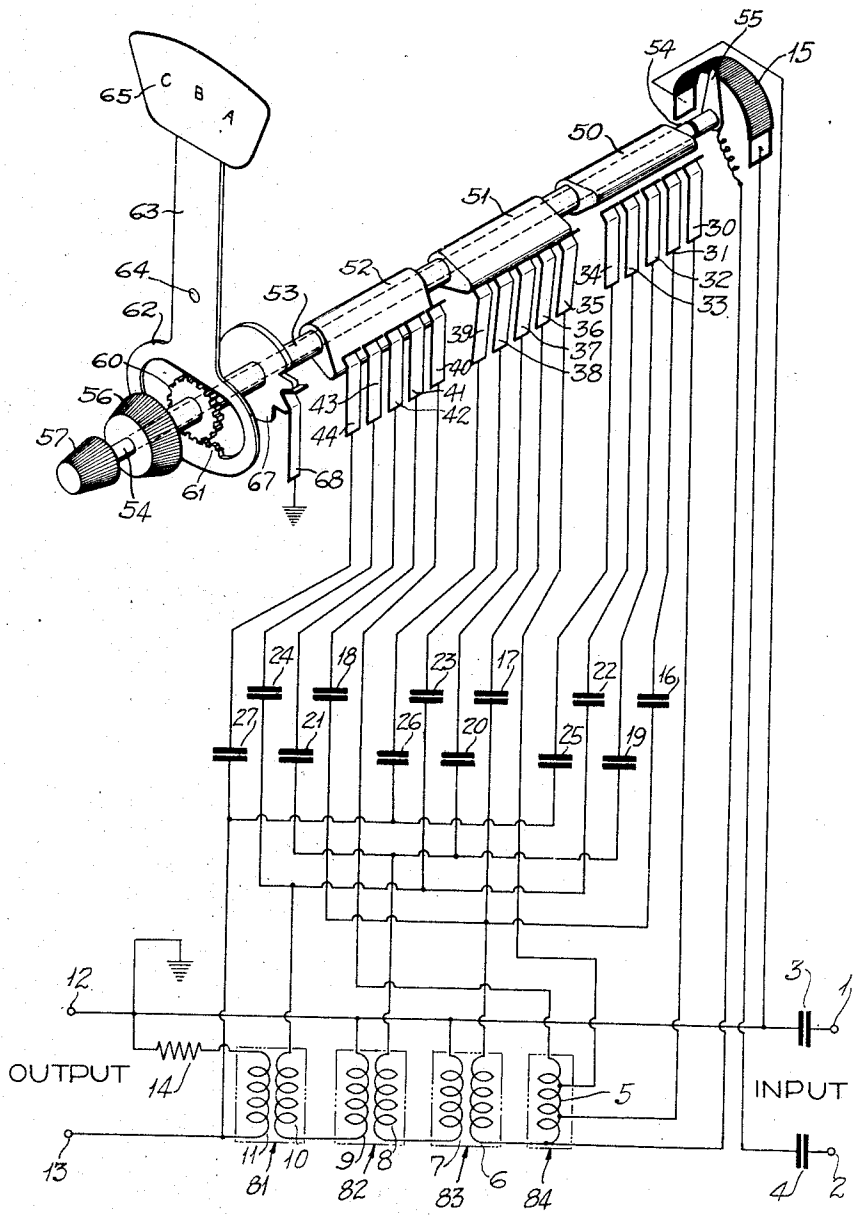
June 14, 1932. A. H. HOTOPP, JR 1,863,050

RADIO FILTER APPARATUS

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FIG. 1



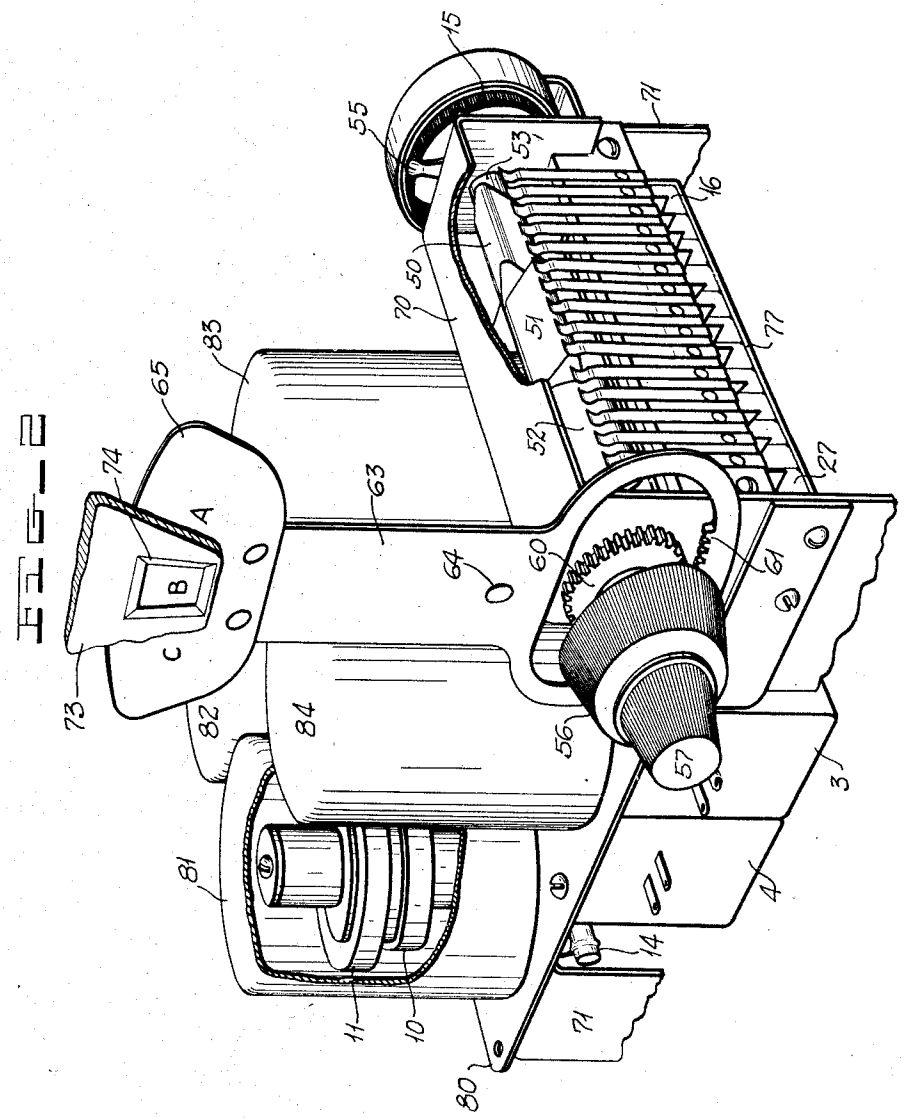
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RADIO FILTER APPARATUS

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FIG. 2



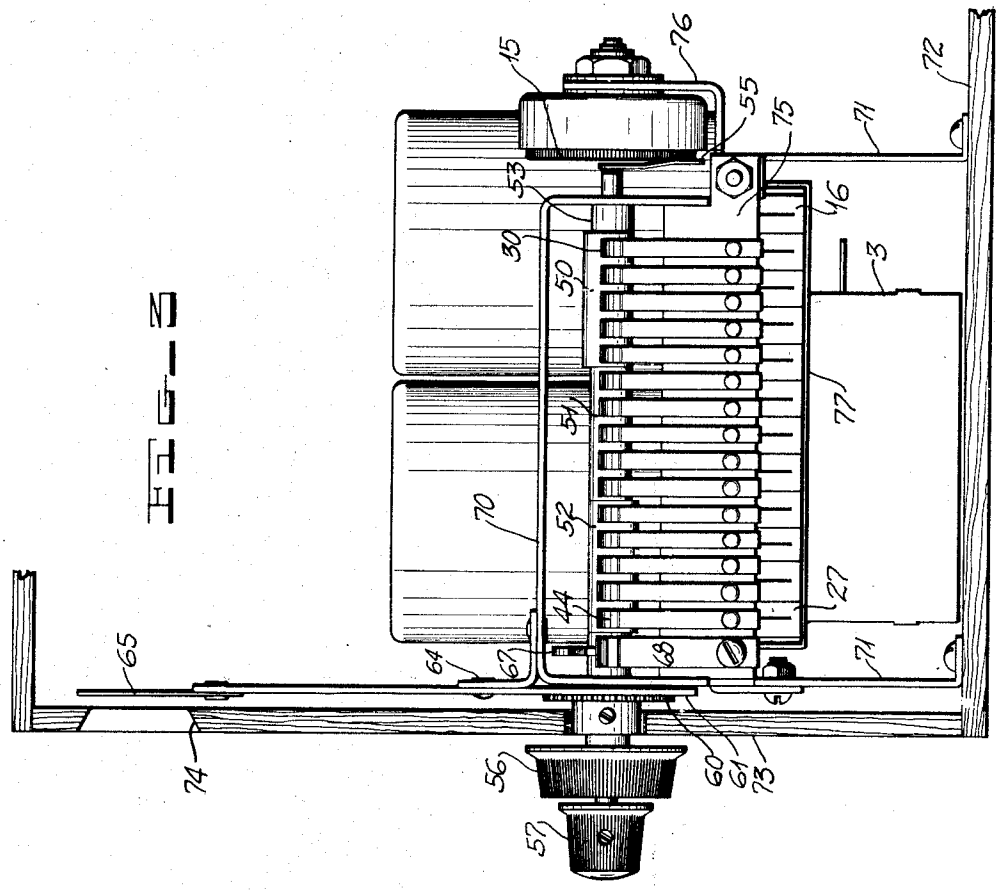
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FIG. 3



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Patented June 14, 1932

1,863,050

UNITED STATES PATENT OFFICE

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RADIO FILTER APPARATUS

Application filed July 14, 1931. Serial No. 550,665.

My invention pertains in general to the construction of radio receiving apparatus and specifically relates to the construction of a selective radio filter.

One of the objects of my invention consists in providing radio filter apparatus having a compact and efficient type of switch mechanism for rendering the filter circuits selectively responsive to a plurality of discrete bands of frequencies.

Another object consists in providing radio filter apparatus having a plurality of cams angularly disposed upon a common shaft for sequentially actuating a plurality of groups of switch contacts.

These and other desirable objects will be apparent from the following, reference being had to the accompanying drawings in which like reference numerals designate corresponding parts throughout and in which;

Fig. 1 is a schematic representation of the electrical organization of my radio filter apparatus;

Fig. 2 is a partial perspective view of one embodiment of the radio filter apparatus of my invention; and

Fig. 3 is a full side elevation of the representation of Fig. 2.

My invention is directed to providing a compact form of radio filter apparatus having a unified switching system operable from a central control unit. This switching system is provided with means for indicating, with reference to an index, the position of the switching elements for effecting control of the filter apparatus.

Referring to the drawings in detail and particularly to Fig. 1, input terminals 1 and 2 are provided having connections to coupling condensers 3 and 4. Coupling condenser 3 is connected to one side of three inductances 7, 9, and 11, and thence to a grounded output terminal 12. The coupling condenser 4 is connected to an auto-transformer inductance 5 and an inductance 6 electromagnetically coupled to an inductance 7. Other inductances 8 and 10 are electromagnetically coupled to the inductances 9 and 11, respectively. Taps are provided from the auto-transformer inductance 5 to spring contacts 30, 35, and 40. The inductance 6 has connections to capacitances 16, 17, and 18. The inductance 8 has connections to the capacitances 19, 20, and 21, and the inductance 10 has connections to the capacitances 22, 23, and 24. The inductance 11 has connections, as shown, to the capacitances 25, 26, and 27. The inductances 5 to 11 and capacitances 16 to 27, in combination, form a band pass filter system having a terminating impedance 14. This filter system is responsive to predetermined bands of high frequency currents depending upon the selection of the associated capacitances. Such a filter system is described in detail in a co-pending application of Robert D. Duncan, Jr., Serial Number 495,823, filed November 15, 1930, and entitled "Filter system".

A potentiometer resistance 15 is connected across the input of the filter system for controlling the energy level of the high frequency currents passing therethrough. The capacitances 16, 17, and 18 are connected to spring contacts 31, 36, and 41, respectively, while the capacitances 19, 20, and 21 are connected to the spring contacts 32, 37, and 42, respectively. The capacitances 22, 23, and 24 are connected to the spring contacts 33, 38, and 43, while the capacitances 25, 26, and 27 are connected to the spring contacts 34, 39, and 44, respectively.

According to my invention, three metallic cams 50, 51, and 52 are secured upon a hollow metal shaft 53. The cam 50 is adapted for engagement with the spring contacts 30 to 34. The cam 51 is adapted for engagement with the spring contacts 35 to 39, and the cam 52 is adapted for engagement with the spring contacts 40 to 44. The cams 50, 51, and 52 are angularly disposed upon the shaft 53 in a manner such that the cams 50, 51, and 52 sequentially engage with their respective spring contacts. Another shaft 54 is rotatably mounted internally of the hollow shaft 53. The shaft 54 connects with a wiping contact 55 engaging with the potentiometer resistance 15 for controlling the energy level of the high frequency currents in the filter system. A suitable bushing is provided for

electrically insulating the contact 55 from the shaft 54.

The hollow shaft 53 is provided with a knob 56 and the hollow shaft 54 is provided with a knob 57 co-axial with the knob 56.

A spur gear 60 is rigidly secured upon the shaft 53 and engages with an arcuate rack 61 forming part of a metallic loop 62 integral with a metallic member 63 rotating about the pivot 64. The member 63 is provided with a plate 65 having designations "A", "B", and "C". This plate is provided for purposes of indicating the relative position of the cams 50, 51, and 52 with respect to their associated spring contacts.

A disk 67 is mounted upon the shaft 53 and is provided with three peripheral indents corresponding to the three angular positions of the shaft 53 in which the cams 50, 51, and 52 are, respectively, in engagement with their associated spring contacts. A resilient detent member 68, electrically grounded, is provided for engagement with the detents in the metallic disk 67. As the knob 56 is rotated to cause the cams 50, 51, and 52 to sequentially engage with their respective spring contacts, the gear 60 causes the member 63 to be moved about the pivot 64 whereby the plate 65 is moved so that the designations thereon indicate, with reference to an aperture described later, the relative position of the cams 50, 51, and 52.

Consideration will now be given to the mechanical construction of the electrical elements schematically depicted in Fig. 1. Referring to Fig. 3, the shaft 53 is rotatably mounted in mounting structure 70 having legs 71 secured to a base member 72. The base member 72 is secured to a front panel 73 having a hole through which the shaft 53 and hub of gear 60 extend. The pivot 64 is mounted, as shown, in a continuation of the mounting structure 70. An aperture 74 is provided in the panel 73 and is of a size such as to register with one of the designations "A", "B", and "C" on the plate 65. The spring contacts 30 to 44 and the detent member 68 are mounted upon an insulating member 75 secured to the mounting structure 70 so that the contacts are aligned in a plane parallel to the axis of shaft 53 and are positioned with proper relation to their associated cams. The potentiometer 15 is secured by the bracket 76 which forms part of the mounting structure 70.

The capacitances 16–27 are held by a bracket 77 beneath the insulating member 75. Suitable connections are provided from these capacitances to the groups of contacts 30 to 44. The mounting structure 70 includes a plate 80 upon which are mounted shielding cans 81, 82, 83, and 84 which contain the inductances 5 to 11. The resistor 14, comprising the filter terminating impedance, is mounted beneath the plate 80. The coupling condensers 3 and 4 are mounted beneath the plate 80.

The mechanical structure of my radio filter apparatus as depicted in Figs. 2 and 3 is intended to be incorporated in any desirable type of radio receiving organization. The base member 72 and panel 73 may be a continuation of the normal structure of a radio receiving cabinet. It will be evident, therefore, that the structure of my invention provides a compact and unitary arrangement which can be easily adapted to the construction of radio receivers.

In the operation of my radio filter system the knob 56 extending exteriorly of the panel 73 is moved to a position such that one of the designations "A", "B", and "C" appears at the aperture 74. In such position one of the cams 50, 51, or 52, depending upon the will of the operator, will be in engagement with its respective group of associated spring contacts whereby the radio filter system will be made electrically responsive to a desired band of frequencies.

When it is desired to adjust the energy level of any particular program, the knob 57 may be moved whereby the wiping contact 55 is moved over the potentiometer resistance 15 to control the signal energy level. The movement of the knob 57 is entirely independent of the knob 56. However the close proximity of the knob 57 to the knob 56 makes it unnecessary for the operator to remove his hand from the position required for manipulation of the knob 56.

It will be evident from the foregoing that my invention provides a compact and unitary construction of radio filter apparatus which is extremely simple in its operation and control. Although I have shown a preferred embodiment of my invention, I do not wish to be limited thereto except insofar as may be pointed out in the appended claims.

What I claim as new and original and desire to secure by Letters Patent of the United States is:

1. Radio filter apparatus comprising, a panel having an aperture therein, an electrical circuit having a plurality of predetermined circuit constants, a plurality of switches for sequentially rendering said constants electrically effective in said circuit, a hollow shaft connected to said switches and extending through said panel, a knob mounted upon said shaft, a shaft rotatably mounted internally of said first mentioned shaft, a variable resistance connected in circuit with said switches and controlled by movement of said last mentioned shaft, another knob mounted on said second mentioned shaft in close proximity to said first mentioned knob, and an indicating plate having a plurality of designations thereon and adapted to be actuated by said first mentioned shaft whereby said designations are

brought into register with said aperture one at a time.

2. Radio filter apparatus comprising, a selective filter system having a plurality of groups of capacitances, a plurality of groups of contacts each group of which connects to one of said groups of capacitances, a shaft, a plurality of cams mounted on said shaft and angularly displaced from each other for sequential engagement with said groups of contacts, a panel having an aperture therein, a plate having indicia thereon, and means under control of said shaft for moving said plate for causing different elements of said indicia to register with said aperture.

3. Radio filter apparatus comprising, a panel having an aperture therein, a filter circuit having a plurality of different values of circuit constants, switches for rendering predetermined values of said constants electrically effective in said filter circuit, means for sequentially actuating said switches, and a plate member having the designations "A", "B", and "C" thereon and adapted to be moved by said last mentioned means whereby said designations are brought into register with said aperture one at a time.

4. Radio filter apparatus comprising, mounting means, a plurality of circuit components mounted upon said mounting means, a rotatable shaft, a plurality of resilient contact members aligned in a plane parallel to the axis of said shaft, said contact members being connected to said circuit components, a plurality of angularly displaced projecting members on said shaft for sequentially engaging with different groups of said contact members when said shaft is rotated, an indent member mounted upon said shaft, and a resilient detent member for engaging with said indent member.

ALFRED H. HOTOPP, JR.