Feb. 26, 1935. J. I. BELLAMY 1,992,599

RADIO APPARATUS

Filed Nov. 9, 1931

Fig. 2

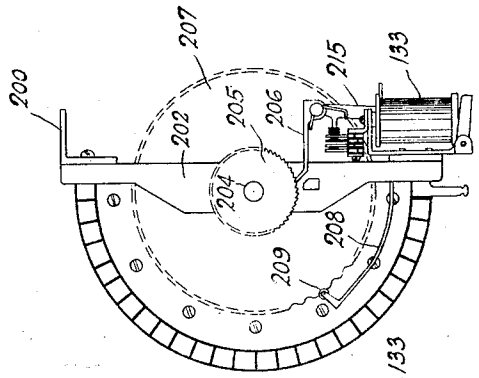


Fig. 4

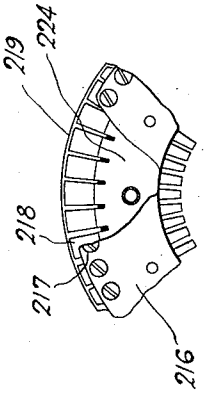


Fig. 3

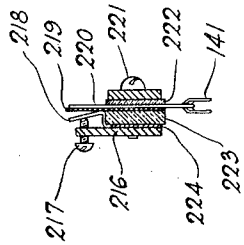
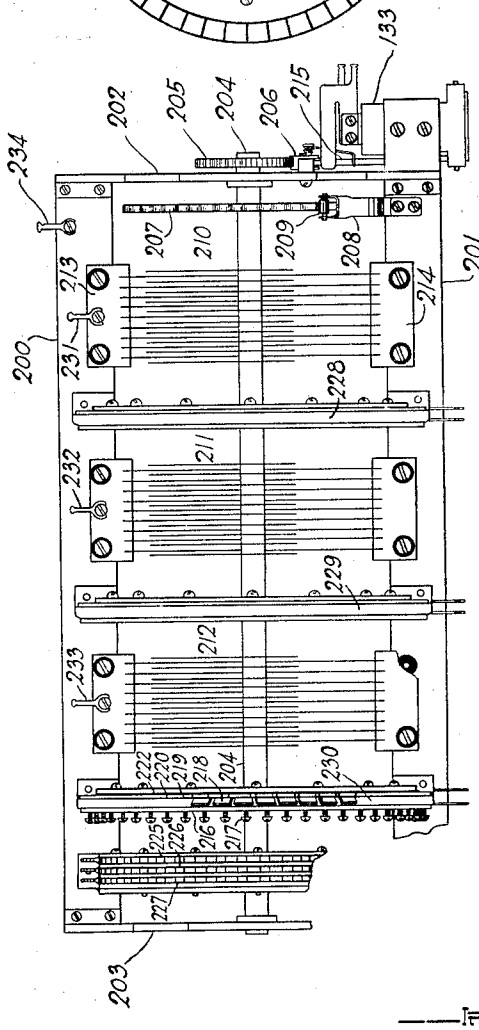


Fig. 1



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1,992,599

UNITED STATES PATENT OFFICE

1,992,599

RADIO APPARATUS

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Application November 9, 1931, Serial No. 573,864

8 Claims. (Cl. 175—41.5)

The present invention relates in general to radio apparatus, and the main object of the invention is the provision of a tuning or control switch for a radio receiving set.

The switch claimed in the present application is disclosed in application Serial No. 467,192, filed July 11, 1930, in which prior application a method of remotely controlling the switch from a distant point is disclosed.

A particular feature of the invention lies in the arrangement whereby auxiliary tuning condensers are selected simultaneously with the rotation of the main variable tuning condensers to exactly tune the receiving set to respond to a desired broadcasting station.

A clear understanding of the above and other features of the invention not specifically mentioned may be had from the following detailed specification when read in connection with the accompanying drawing comprising Figs. 1 to 4, inclusive, in which:

Fig. 1 is a plan view of the improved tuning switch;

Fig. 2 is an end view of the switch; and

Figs. 3 and 4 show the detailed construction of the auxiliary tuning condensers incorporated in the switch.

Referring to the drawing, the switch consists of two angle mounting brackets, 200 and 201, upon which the switch banks and the stationary plates of the condensers are mounted. At the ends of these brackets are the strips 202 and 203 which serve as bearings for the shaft 204. Upon the two angle mounting brackets 200 and 201 are mounted the switch banks 225, 226, 227, 228, 229 and 230 and the stationary sections of the main tuning condensers 210, 211 and 212.

Connections to the stationary sections of the main tuning condensers 210 to 212, inclusive, are made by means of terminals 231, 232 and 233. The ground connection to the movable sections of these condensers is made by means of terminal 234 and through the shaft of the switch.

At one end of the switch is mounted the driving magnet 133 with its armature 215 and driving pawl 206. The shaft 204 is rotatably suspended in bearings in the end pieces 202 and 203 and mounts the wipers of the switch (not shown) which engage banks 225 to 230, inclusive, and also the movable sections of the main tuning condensers 210, 211 and 212. Mounted at one end of the shaft in a position so that its teeth will be engaged by the driving pawl 206 is the driving ratchet wheel 205. The holding and centering arrangement consists of a wheel 207 having indentations in its periphery in the form of a sine wave. These indentations are adapted to be engaged by the roller 209, which is held in position by the spring 208. The spring 208 is very stiffly tensioned so that the roller 209 will be forced to the bottom of the depression in the periphery of the wheel 207, thereby exactly centering the wipers and condensers of the switch in each of its positions to provide sharp tuning of the radio set at each position of the switch.

The three banks 228 to 230, inclusive, are provided with auxiliary tuning condensers as shown in Figs. 1, 3, and 4 of the drawing. The outer ends of the bank contacts, such as 220, form one plate of the auxiliary condensers.

A comb-like element 224 similar in shape to the switch bank and having teeth, such as 218, is mounted under the clamping plate of the switch bank and separated from the switch bank contacts by means of the mica insulator 219. The teeth of this comb-like element serve as the other plate of the auxiliary condensers, and the position of these teeth may be adjusted with respect to the bank contacts by means of the adjusting screws, such as 217. Insulating blocks 222 and 223 are provided to provide proper spacing between the elements of the bank, and the complete assembly is held in position by means of the clamping screws, such as 221. This common element of the auxiliary condensers is provided with a terminal, and all three of these elements may be connected together to one terminal of the filament battery as shown in the circuit diagram of Fig. 3 of the parent application.

The main tuning condensers, such as 210, 211 and 212, are straight line condensers so that the change in capacity will be proportional to the amount of rotation irrespective of the position of the condensers.

The switch illustrated has twenty-five positions and, therefore, provdes for tuning the associated radio receiving set to any one of twenty-five different broadcasting stations. The size of the switch may be increased so as to provide any number of positions up to one hundred, thereby allowing the radio set to be tuned to any one of the assigned broadcasting channels.

Each broadcasting channel is assigned a call number such that the operation of the switch to the position corresponding to the call number will rotate the main tuning condensers 210 to 212, inclusive, to positions which will approximately tune the radio set to respond to the particular broadcasting channel. The three auxiliary

condensers associated with the bank contacts of banks 228 to 230, inclusive, on which the associated wipers are resting are then separately adjusted until the set is exactly tuned to respond to the desired channel. The same procedure is followed for each position of the tuning switch. All the auxiliary condensers are adjusted in this manner when the system is installed, and thereafter the operation of the tuning switch to the position corresponding to the call number of the desired broadcasting station will exactly tune the radio set to respond to the frequency of the desired station. The manner in which the banks 225 and 226 are marked under control of a dial at a remote control station and the manner in which the stepping magnet 133 of the tuning switch is controlled to step the switch to the desired position are clearly illustrated and described in the parent application referred to above.

It is to be understood that the invention is not limited to a remotely controlled tuning switch but is also applicable to a manually operated switch, in which case the magnet 133 and the control wipers and banks would be unnecessary. The ratchet wheel 205 could then be replaced by any convenient knob or dial to allow the shaft to be rotated manually. In this case, the condensers formed by the bank contacts may be separately adjusted in each position of the switch to compensate for any unbalance in the tuning of the different stages due to differences in characteristics of the condensers 210, 211, and 212 or their associated inductances. The variable condensers 210 to 212, inclusive, may then also be used as vernier condensers to exactly tune the receiving set. This is possible since the bank contacts are wide enough to allow the shaft to be rotated sufficiently in either direction at any particular setting to provide for vernier adjustment, without moving the wipers to the adjacent bank contacts and thereby cutting in different auxiliary condensers.

What is claimed is:

1. In combination, a rotary switch having a wiper and a bank, said bank composed of a plurality of individual bank contacts, a comb-like element similar in shape to said bank and having a plurality of teeth equal in number to said bank contacts, said teeth extending substantially parallel to the outer ends of said bank contacts, and means for adjusting the position of each of said teeth with respect to its associated bank contact.

2. In combination, a rotary switch having a bank consisting of a plurality of individual bank contacts, a comb-like element similar in shape to said bank and mounted parallel thereto, a plurality of teeth on said element equal in number to said bank contacts and extending parallel to the outer ends of said contacts, each tooth and its associated bank contact forming a condenser, and individual means for adjusting the position of each tooth with respect to its associated bank contact, thereby varying the capacity of said condenser.

3. A radio tuning switch comprising a rotatable shaft, a plurality of variable condensers having their movable elements mounted on said shaft, a plurality of auxiliary condensers associated with each of said variable condensers, and a plurality of wipers mounted on said shaft, one for each variable condenser, for successively selecting different sets of auxiliary condensers as said shaft is rotated.

4. A radio tuning switch comprising a rotatable shaft, a variable condenser having its movable element mounted on said shaft, a plurality of auxiliary condensers, means for rotating said shaft to vary the capacity of said variable condenser, and means controlled by said shaft for successively selecting all of said auxiliary condensers during a single revolution of said shaft, said means allowing small changes in the capacity of said variable condenser to be made at any position of said switch without causing the selection of a different one of said auxiliary condensers.

5. A radio tuning switch comprising a rectangular frame, a rotatable shaft mounted on said frame, a plurality of variable tuning condensers having their stationary elements mounted on said frame and their movable elements mounted on said shaft, a plurality of rows of bank contacts mounted on said frame, one row for each variable condenser, an auxiliary condenser associated with each bank contact in each row, a plurality of wipers mounted on said shaft, one for each row of bank contacts, and means for rotating said shaft to vary the capacities of said variable tuning condensers and to cause said wipers to successively select sets of said auxiliary condensers.

6. In a radio tuning switch, a shaft, a variable condenser having its movable element mounted on said shaft, said shaft having a plurality of predetermined positions and each position approximately adjusting the capacity of said condenser to a different predetermined value, means for rotating said shaft to any of said positions, a plurality of auxiliary condensers, and means for selecting a different one of said auxiliary condensers in each of said positions.

7. The combination in a radio tuning switch having a plurality of positions each of which corresponds to a different predetermined capacity value, of a variable condenser whose capacity approximately equals the predetermined capacity value in each position of said switch, a plurality of auxiliary condensers one for each position of said switch, each auxiliary condenser having its capacity adjusted to a value which when added to the capacity of said variable condenser in the corresponding position of said switch will exactly equal the predetermined capacity value for that position, and means for selecting the proper auxiliary condenser in each position of said switch.

8. A radio tuning switch comprising a frame, a rotatable shaft mounted on said frame, a plurality of variable condensers having their stationary elements mounted on said frame and their movable elements mounted on said shaft, a plurality of rows of bank contacts arranged in arcs and mounted on said frame, one row for each variable condenser, a like plurality of wipers mounted on said shaft so as to engage said rows of bank contacts, respectively, and an auxiliary condenser associated with each bank contact in each row, said auxiliary condensers being adjustable to balance said variable condensers in each position of said switch.

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