Feb. 6, 1934. C. M. WILCOX 1,945,795

RADIO RECEIVING APPARATUS

Filed July 26, 1928 2 Sheets-Sheet 1

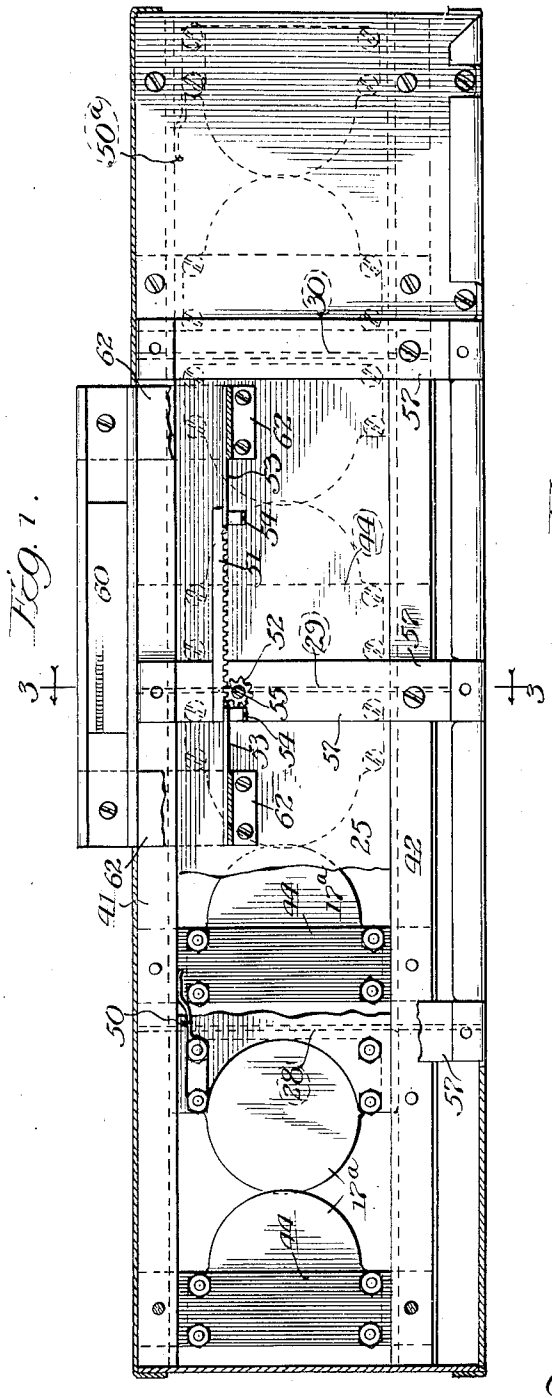


Fig. 1.

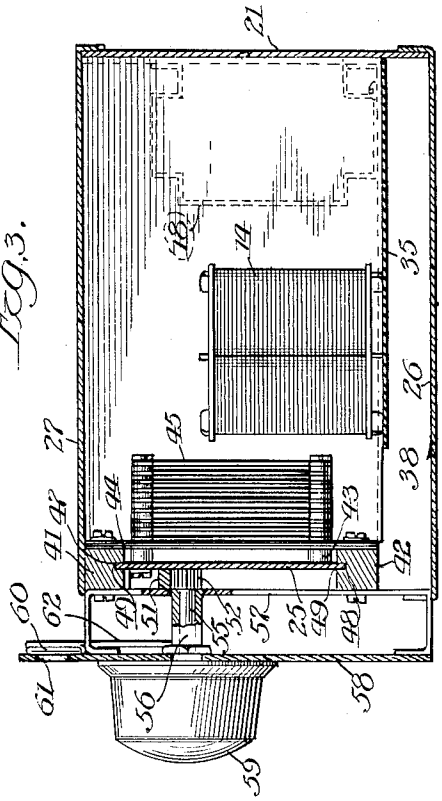


Fig. 3.

Inventor
Chester M. Wilcox
by Arthur L. Sprinkle
Atty.

Feb. 6, 1934. C. M. WILCOX 1,945,795

RADIO RECEIVING APPARATUS

Filed July 26, 1928 2 Sheets-Sheet 2

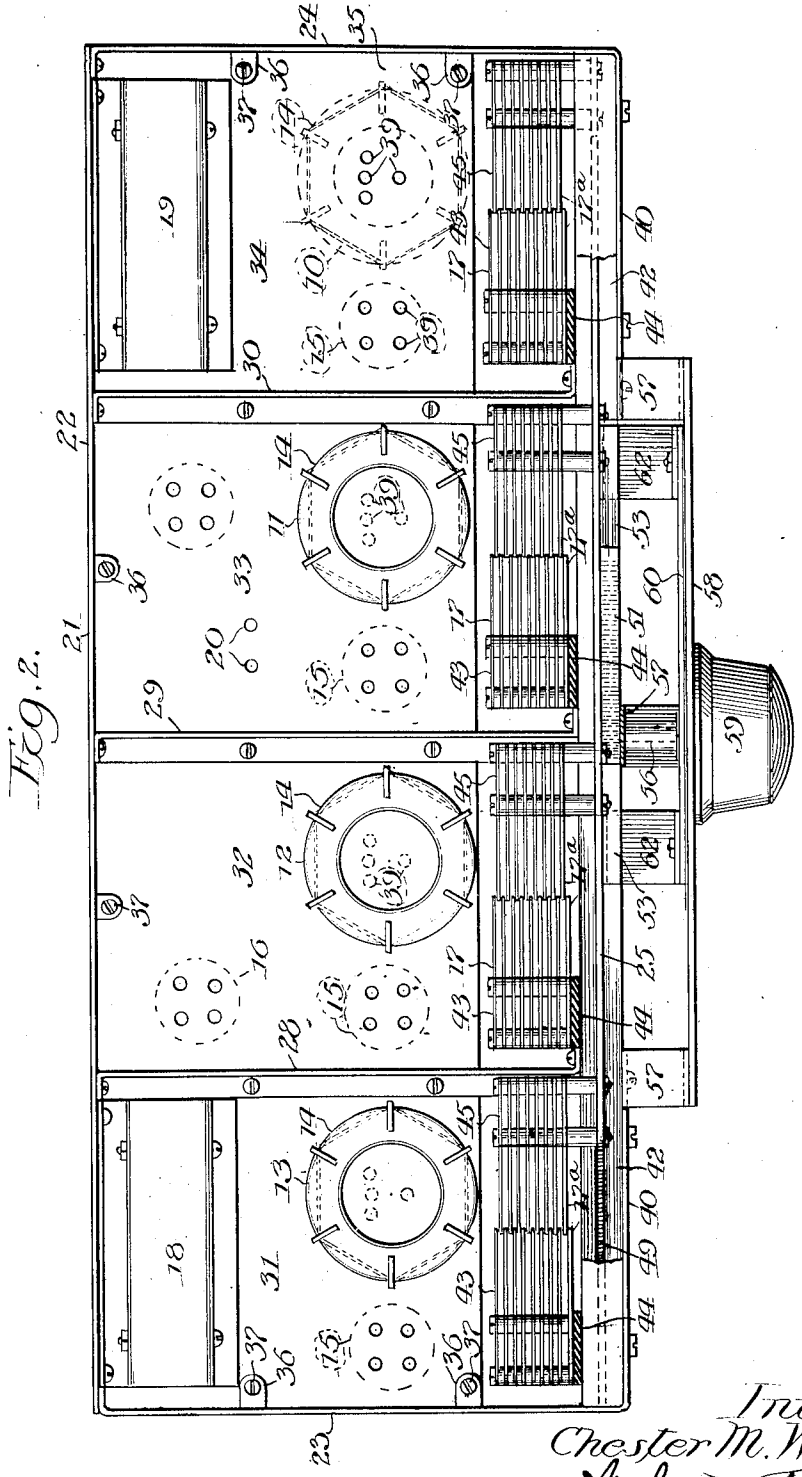


Fig. 2.

Inventor
Chester M. Wilcox
by Arthur L. Sprinkle
Atty.

Patented Feb. 6, 1934 1,945,795

UNITED STATES PATENT OFFICE

1,945,795

RADIO RECEIVING APPARATUS

Chester M. Wilcox, Charlotte, Mich., assignor to General Apparatus Corporation, New York, N. Y., a corporation of New York

Application July 26, 1928. Serial No. 295,391

3 Claims. (Cl. 250—16)

This invention relates to radio receiving apparatus and particularly to devices of this character which employ a plurality of tuned resonant circuits arranged in proximity to each other for co-operation with each other.

It is the prime object of my invention to provide in radio receiving apparatus of the described character an adjustable condenser apparatus for the simultaneous tuning of a plurality of resonant circuits, having certain improved features of mechanical construction and arrangement of parts whereby to procure improved results in operating efficiency of the condenser apparatus.

It is a further object of the invention to improve generally the mounting and shape of plates together with manner of adjustments of their intersections in a condenser unit of the described character.

It is one of the objects of the invention to provide a device employing a plurality of tuned resonant circuits with means whereby one resonant circuit of said plurality is protected or insulated against the electrical influences or magnetic forces set up or created by another or adjacent resonant circuit to thereby obtain the highest degree of efficiency from each circuit and to prevent inter-reaction between any two resonant circuits.

The invention has as an object the accomplishment of the above advantages by the provision of a casing having separate compartments, the walls of which are formed of material which is capable of protecting or insulating each resonant circuit against electrical or magnetic forces set up or created by another or adjacent resonant circuit.

It is a further object to provide a radio receiving set which employs condensers having elements which are so associated as to have improved relations and movements with respect to each other and to locate said condensers in separate compartments and resulting in a construction whereby all of the movable condenser elements are secured together upon a member which provides a carriage, which carriage is mounted in a manner to provide synchronous movement of all of the movable condenser elements.

In addition to the above, it is an object to provide a longitudinally movable member and a rotatable element for moving said member such as, for example, a rack and pinion to provide means for moving said carriage, and to yieldably mount said rack so that engagement between the teeth of said rack and pinion will at all times be insured and provide for positive and certain movement of said carriage without backlash upon rotation of the pinion.

It is a further object to provide means for acting upon the carriage to assist in maintaining the rack and pinion in co-operative relation with each other and to also assist in holding the carriage in a track or guideway provided for the carriage.

It is also an object of the invention to employ the track or guideway for the carriage as a support for the stationary portion of the condensers and to employ said track or guideway as a frame to which certain elements of the casing may be attached.

Another object of the invention is the provision of a scale or indicator which is movable upon actuation of the condensers and to associate said scale with the aforesaid longitudinally movable carriage.

This invention will be explained and more readily understood when read in conjunction with the accompanying drawings which illustrate one embodiment of which the invention is susceptible, it being obvious that changes and modifications may be resorted to without departing from the spirit of the invention as herein described and particularly defined in the appended claims forming a part hereof.

In the drawings:

Fig. 1 is a front elevation with certain portions of the structure omitted for the purpose of illustration.

Fig. 2 is a plan view of the structure shown in Fig. 1, and

Fig. 3 is a vertical section taken on line 3—3 of Fig. 1.

The embodiment of the invention illustrated in the drawings contemplates provision of means for housing the several tuned resonant circuits or amplifying units generally designated 10, 11, 12 and 13, which in the structure illustrated, employ a coil 14 detector tube 15, an amplifying tube 16 and a condenser 17 and in which the transformers 18 and 19 are connected in circuit with the tubes, coils and condensers. Any desired receiving circuit may be employed with the elements just referred to and provision is made through the medium of the contacts 20 for completing a connection between said circuit or sound reproducing device and a speaker.

The means for housing the several amplifying units 10 to 13 and preventing electrical influences set up by one unit from interfering with and preventing the proper functioning of another

or adjacent unit contemplates a casing generally designated 21, which provides the side wall 22, the end walls 23 and 24, the front wall 25, the bottom wall 26 and the removable lid or cover 27. This casing is provided with a plurality of transverse walls 28, 29 and 30, which divide the casing into separate compartments 31, 32, 33 and 34, in which are arranged and housed the respective amplifying units 10 to 13.

To provide for the prevention of interference between the various amplifying units by the electrical influences set up during the operation of said units, the walls forming the several compartments 31, 34, which walls include the casing, are of material as aluminum, which is of such a nature as to effectively act as an electro-magnetic and electro-static shield and insulates one unit against the influences of an adjacent unit, resulting in greater efficiency of operation of the several units.

The transverse walls 28, 29 and 30 do not extend to the bottom wall 26 of the casing and a piece of some suitable material 35, preferably fiber, is arranged at the lower edge of said transverse walls. The fiber or insulating piece 35 is extended from one end wall 23 to the other end wall 24, and from the side wall 21 to adjacent the front wall, the fiber piece 35 being held in place through the medium of elements 36, 36 which are punched from the material of the side end walls and bent inwardly to provide supports for the insulating piece 35, the latter of which is held in associated relation with said supports by bolts and nuts 37. By arranging the insulating piece 35 in the manner just referred to, that is, in spaced relation to the bottom wall 26, a compartment 38 is provided in which to house the various devices, conductors and contacts (not shown) leading to the several elements of the amplifying units. The fiber piece or strip 35 is provided with several apertures such as 39 through which the contact elements of the various elements of said units may be projected into contacting relation with the contact springs, etc., which it is intended to locate in said compartment 38. The end walls forming the casing are bent to form part of the front wall of the casing, as indicated at 40, and to provide means to which the guide rails 41 and 42 may be secured to provide a support for said rails. These rails 41 and 42 provide means for supporting the stationary part 43 of the condensers, generally designated 17, said portions of said condensers being secured to insulating strips 44, 44, one of which strips and stationary condenser element is arranged in each compartment 31 to 34, with said strip secured at its opposite ends to said rails or supports 41 and 42. The movable element, such as 45, of each condenser is secured to a plate which forms the front wall 25 of the casing and provides a carriage and has its opposite edges 47 and 48 located in grooves 49, respectively, provided in said frame or supports 41 and 42, to thus allow for movement of said plate or carriage longitudinally of the casing and to permit synchronous adjustment of these movable portions of said condensers toward and away from the stationary elements thereof located in each compartment.

The condenser elements 43 and 45 are each made up of a plurality of condenser plates which are spaced from each other to allow the plates of the movable condenser element to be moved into the spaces provided between the plates of the stationary condenser elements to thereby vary the effect of said condensers. Each of the condenser plates are formed to provide semi-circular extensions 17*a*, these extensions of the movable condenser elements being designed to be moved relatively to and between similarly shaped portions of the stationary condenser elements to vary the capacity of said condenser, the fullest capacity of the condenser being obtained when the semi-circular portions are arranged to form a complete circle.

Means is provided for compensating for wear between said carriage and tracks in which said carriage operates. This means, in the present instance, is provided through the medium of a plurality of leaf springs 50 and 50*a* which are respectively secured to the carriage at the opposite ends thereof and bear and ride against the underside of the upper rail 41 to force the carriage toward the groove in the lower rail 42. Provision is made for moving the carriage or front wall 25 longitudinally of the casing so as to arrange or adjust the movable element of the several condensers relatively to the stationary element thereof. This means for accomplishing this end includes the yieldably mounted toothed member or rack 51 and the pinion 52. This rack is yieldably secured to the carriage 25 through the medium of the leaf springs 53, 53 arranged at and secured to the opposite ends of the rack. Stops 54, 54 are provided to limit the longitudinal movement of the rack, the stops being designed to engage the pinion 52 and limit the movement of the rack and consequently the carriage. The pinion 52 is secured to a shaft 55 which is journalled in the tubular element 56 secured to and extended from the intermediate one of several supports 57, which are arranged transversely of and extend between the rails 41 and 42, and provide a frame and supports for the face plate 58. The shaft 55 projects through said face plate and has a knob 59 secured thereto for causing the rotation of said shaft. The carriage for the movable elements of said condensers is also provided with means whereby the adjustment of said condensers may be ascertained. This means includes a scale 60 which is arranged in rear of the face plate 58 and is movable relatively to an aperture 61 provided in the face plate, and is secured to the carriage by means of the brackets 62 and 62, which brackets are bent in a manner to provide a support for the outer ends of the leaf springs 53, 53, which springs provide yieldable means for holding the rack in co-operative relation to the pinion.

From the foregoing description of the construction, it is manifest that means are provided whereby the several tuned resonant circuit units are protected or insulated from the forces or action set up by an adjacent unit during the operation of the receiving device and that this is accomplished by the provision of a casing having compartments, in which compartments the respective units are located and the formation of said casing and walls being of material which will act as a shield. It is also evident that the structure discloses a means whereby all of the movable elements of the condensers, which condensers are part of the respective amplifying units, may be moved synchronously with each other toward and away from the stationary portion of said condensers.

In addition to the above, it is evident that a structure is provided whereby this unitary movement of the movable elements of said condensers is accomplished by means of a single rotor or knob having means associated therewith for co-

operation with an element provided upon a carriage which carriage supports the movable elements of the condensers. It is manifest that by yieldingly supporting the rack with which the pinion co-operates, that proper co-operation between the rack and pinion is at all times insured. It is also evident that means is provided for holding the carriage in proper relation to the rack or guide in which said carriage operates, which will compensate for wear between these last mentioned portions of the structure and will also assist in maintaining the rack and pinion in proper co-operating relation and prevent backlash.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In a radio receiving device having tuned resonant circuit units, the combination of a casing, partitions provided in said casing to provide a plurality of compartments in said casing, said casing and partitions being formed of material capable of shielding said units against electro-magnetic and electro-static influences, a tuned resonant circuit unit located in each compartment, said units each having a condenser, each condenser having a stationary and a movable element, the movable element thereof being operable in its respective compartment, and carried by a plate forming one wall of the casing, and means for longitudinally moving the wall for tuning.

2. In a radio receiver having a plurality of variable tuning circuit units, the combination of a casing, partitions provided in said casing to form a plurality of compartments therein, said casing and partitions being formed of non-magnetic conducting material, a circuit unit located in each compartment and each comprising a condenser section, whereby to form an electro-magnetic and electro-static shield protecting said units from interaction through electro-magnetic electro-static coupling, each section including a stationary set of plates and a movable set of plates intermeshing therewith, a movable carriage plate of non-magnetic conducting material having a depth at least as great as the depth of said condensers and mounted at one side of said casing and forming a portion thereof, having a portion exposed in each compartment, and each of said movable sets of plates being secured to said carriage plate, means associated with said casing for maintaining said carriage plate slidably in position at opposite sides thereof, and means for moving said carriage plate for tuning.

3. In a variable tuning condenser, a casing, partitions within said casing forming a plurality of compartments therein, said casing and partitions being formed of non-magnetic, conducting material, a variable condenser section disposed in each compartment, and each comprising a stator section having a plurality of spaced plates and a movable section having a plurality of spaced plates arranged to intermesh, a movable carriage plate having a depth at least as great as the depth of said condenser sections and formed of conducting non-magnetic material, and forming a portion of said shielding casing, and having a portion exposed interiorly in each compartment, and said movable sections being each secured to said carriage plate, and means associated with said casing at opposite sides of said carriage plate for securing the same in position for sliding motion in its own plane.

CHESTER M. WILCOX.