Feb. 7, 1928.

1.658,562

A. A. KENT

RADIO RECEIVING APPARATUS

Filed April 5, 1926

3 Sheets-Sheet 1

Fig. 1.

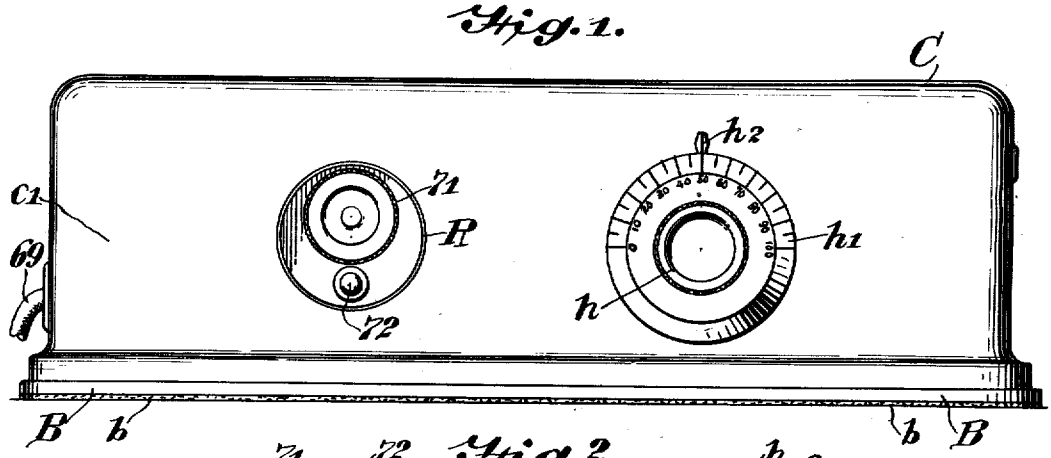


Fig. 2.

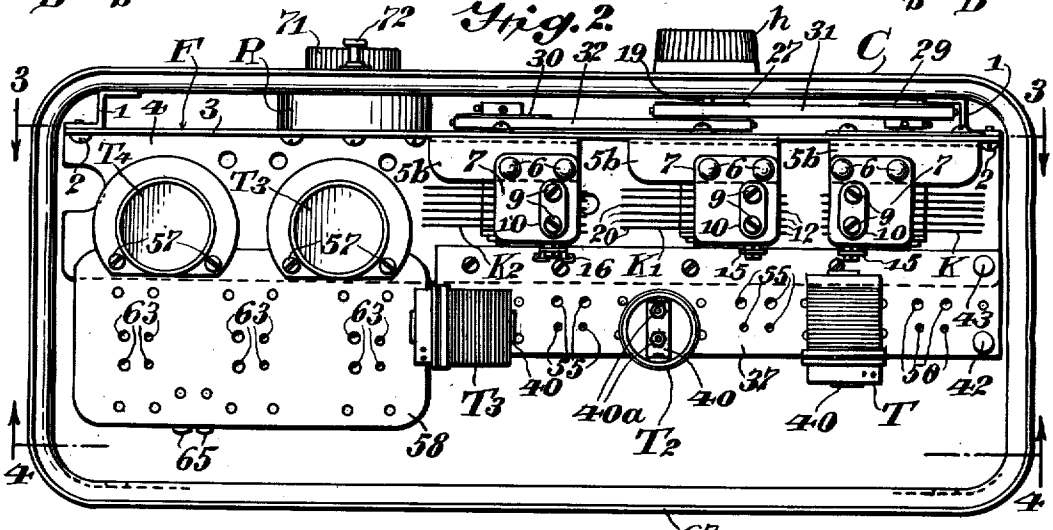


Fig. 3.

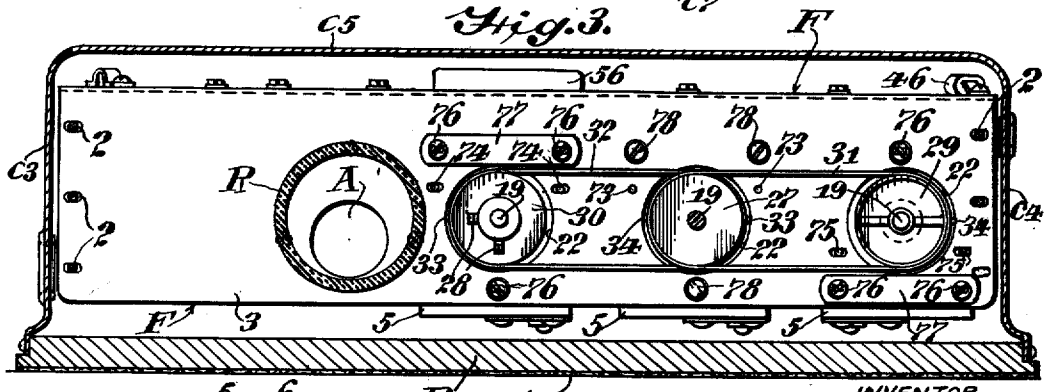
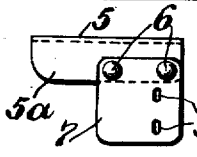


Fig. 13.



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Feb. 7, 1928. 1,658,562

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RADIO RECEIVING APPARATUS

Filed April 5, 1926 3 Sheets-Sheet 2

Fig. 4.

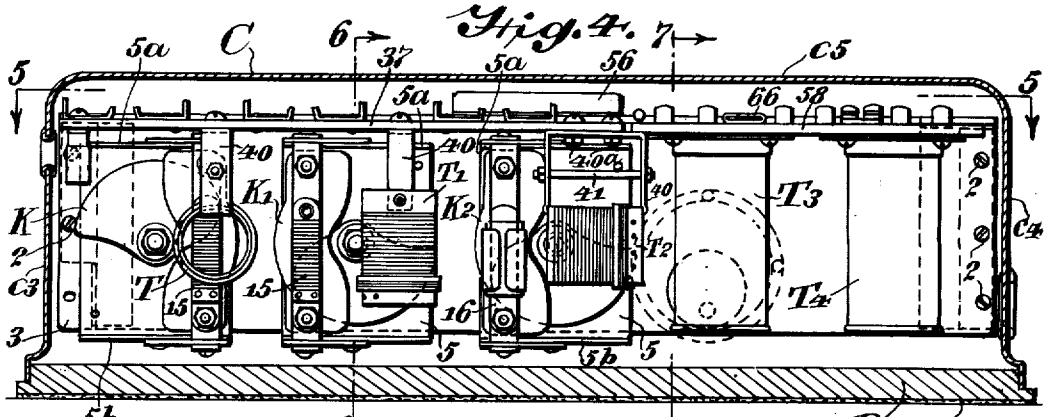


Fig. 5.

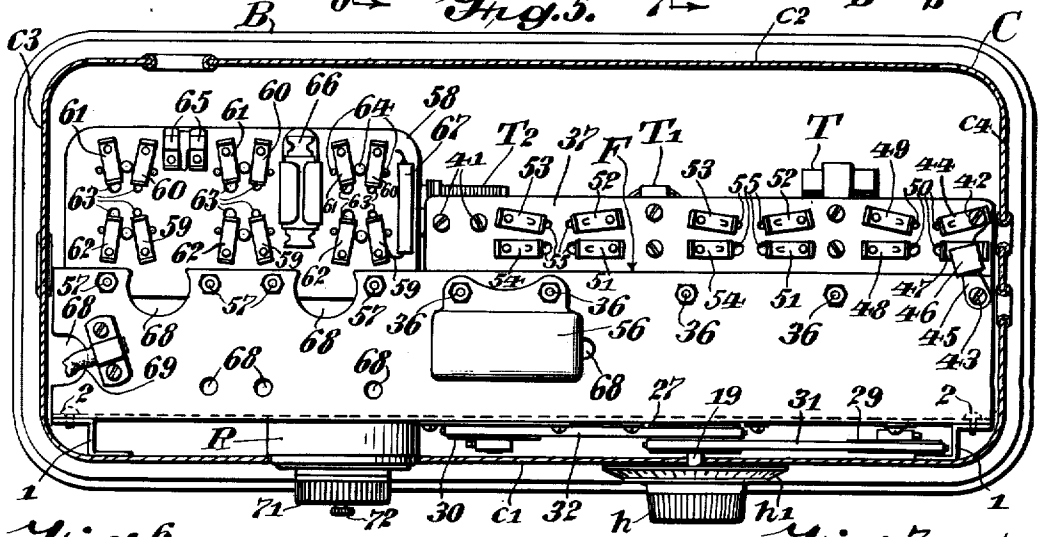


Fig. 6.

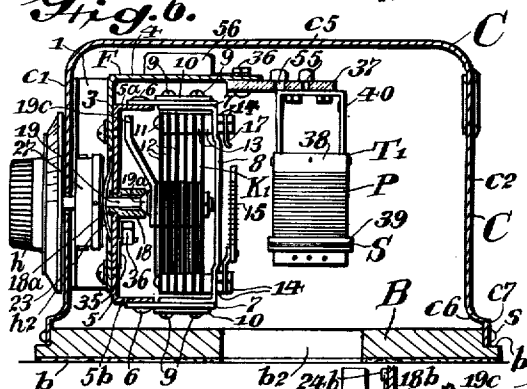


Fig. 7.

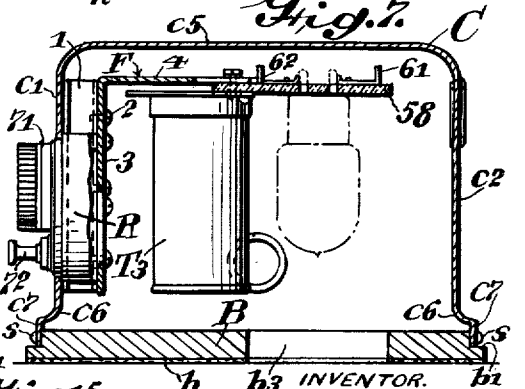


Fig. 14.

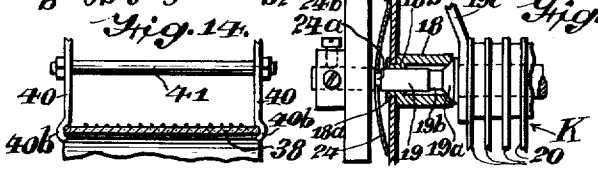
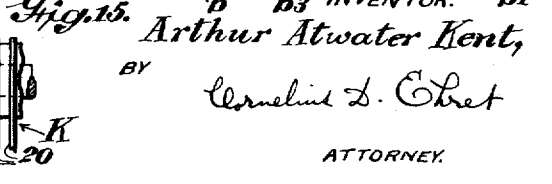


Fig. 15.



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Feb. 7, 1928. 1,658,562

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RADIO RECEIVING APPARATUS

Filed April 5, 1926 3 Sheets-Sheet 3

Fig. 8.

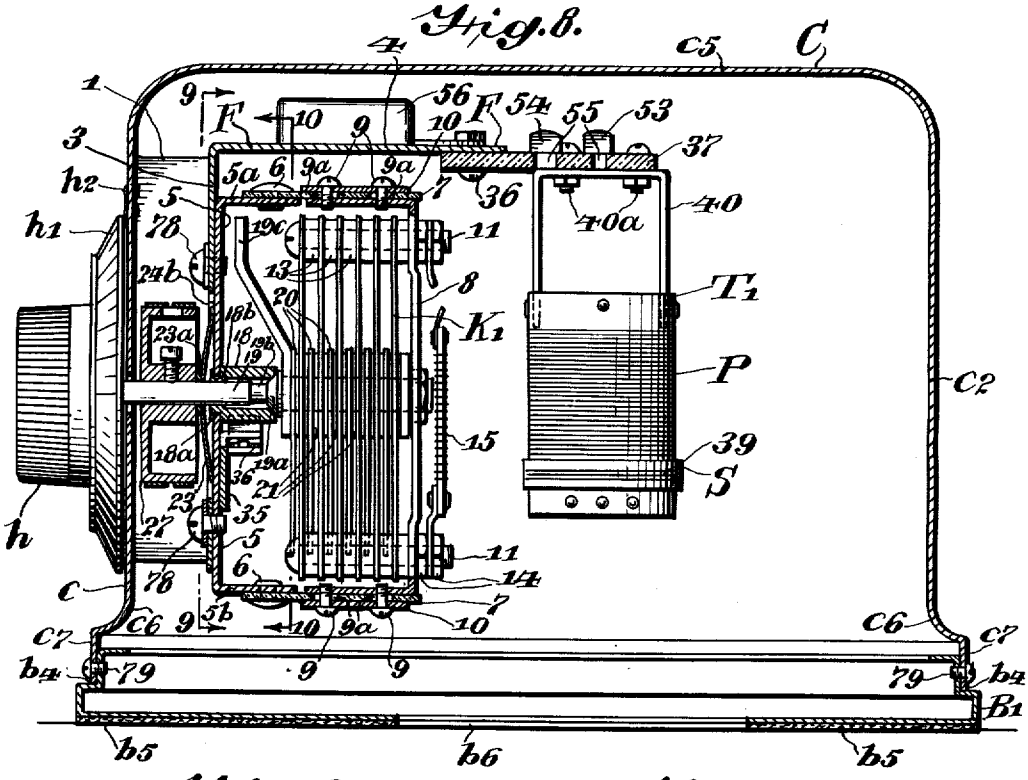


Fig. 9.

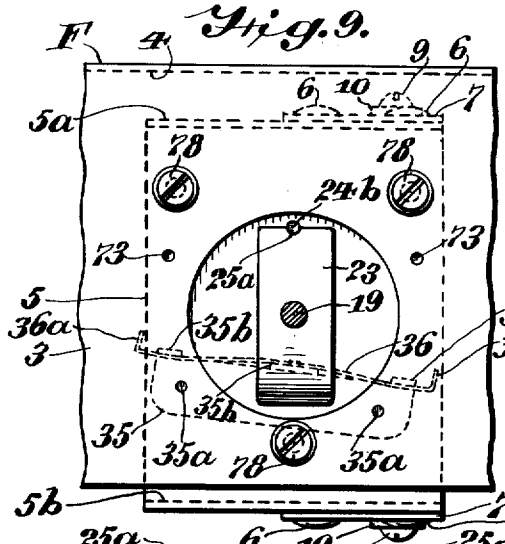


Fig. 10.

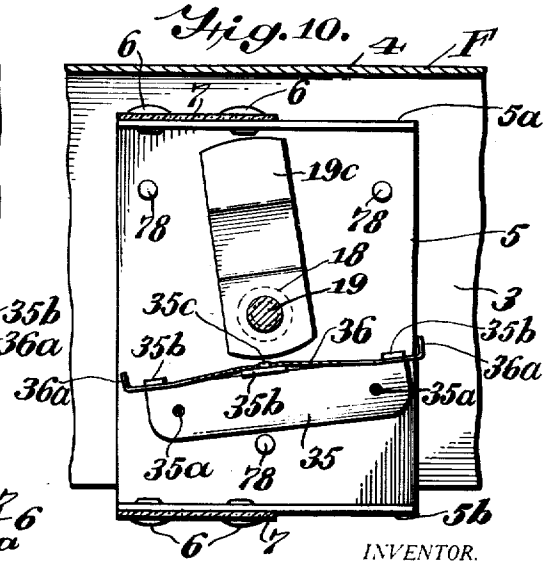


Fig. 11.

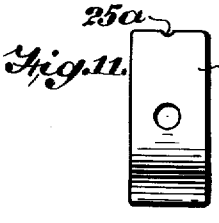
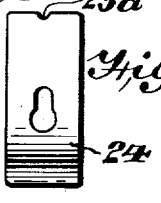


Fig. 12.



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Patented Feb. 7, 1928. 1,658,562

UNITED STATES PATENT OFFICE.

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RADIO RECEIVING APPARATUS.

Application filed April 5, 1926. Serial No. 99,696.

My invention relates to radio receiving apparatus, and more particularly to a cabinet, housing, box or the like within which are supported the various parts or elements comprised in the aforesaid apparatus.

In accordance with my invention, there is provided a one-piece metallic cabinet for housing or enclosing any suitable type of radio receiving apparatus, and more particularly, the apparatus aforesaid is supported within the cabinet solely by a panel or the like in turn secured to a part of the cabinet, as the front wall thereof.

Further in accordance with my invention, to a wall of a one-piece metallic cabinet, preferably dome or arch-shaped, and in spaced parallel relation therewith, there is secured a panel or plate comprising an angularly-disposed shelf or ledge parallel with but closely adjacent the top of the cabinet and depending from said shelf or ledge in inverted positions are parts of the receiving apparatus, as the vacuum tubes and transformer structure, and more particularly, the shelf or ledge aforesaid comprises one or more plates of insulating material having disposed on its or their surface or surfaces nearest the cabinet top the vacuum tube supporting structure.

Further in accordance with my invention, there is provided a cabinet supported by or having a base provided with one or more slots whose dimensions are such that a vacuum tube may be passed therethrough to the cabinet interior.

My invention resides in apparatus and features of construction of the character hereinafter described and claimed.

For an illustration of some of the various forms my invention may take, reference is to be had to the accompanying drawing in which:

Fig. 1 is a front elevational view of radio receiving apparatus constructed in accordance with my invention.

Fig. 2 is an inverted plan view showing the interior of the cabinet and some of the apparatus contained therein.

Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 2.

Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is a vertical sectional view taken on the line 5—5 of Fig. 4.

Figs. 6 and 7 are transverse vertical sectional views taken, respectively, on the lines 6—6 and 7—7 of Fig. 4.

Fig. 8 is an enlarged view corresponding substantially with Fig. 6 but showing a base of a modified form.

Fig. 9 is a vertical sectional view taken on the line 9—9 of Fig. 8.

Fig. 10 is a vertical sectional view taken on the line 10—10 of Fig. 8.

Fig. 11 is an elevational view of a bowed spring for exerting an axial thrust on the rotor shaft of a condenser.

Fig. 12 is an elevational view of another form of bowed spring for exerting an axial thrust on the rotor shaft of a condenser.

Fig. 13 is a plan view of a plate for securing the rotor structure of a condenser to a frame.

Fig. 14 is a fragmentary sectional view showing the supporting structure of a radio frequency transformer.

Fig. 15 is a vertical sectional view showing the bowed spring of Fig. 12 in engagement with a rotor shaft.

Referring to the drawings, there is illustrated a radio receiving set comprising a cabinet, housing or box resting upon and supported by a bottom or base B having along its lower surface a layer or strip of suitable material, as the felt strip b, for protecting the surface of a table or other support upon which the radio set is placed. As shown in Figs. 1 and 3, base B is of wood and is provided with a peripheral channel or notch b^1 against whose vertical edge, as viewed in Figs. 3, 4, 6 and 7, abuts the inside lower surface or edge of cabinet C. It shall be understood that base B may be constructed of a material or composition other than wood, for example, of metal, as iron, steel, aluminum, or the like, and that cabinet C may be supported upon base B in any convenient and suitable manner.

Cabinet C, of any suitable insulating or conducting material, but preferably of iron, steel, aluminum or brass, comprises the front and rear sides or walls c^1 and c^2, the end sides or walls c^3 and c^4, all connected by a top member c^5. Preferably cabinet C is formed or shaped from a single piece of metal into a simulation of an inverted dome or arch-shaped receptacle, which may be assembled with base B to form the complete cabinet structure for housing or enclosing the radio receiving apparatus, hereinafter

described. Preferably cabinet C, along its lower edge or surface, is curved or flared outwardly, as indicated at c^6, Figs. 1, 3, 4, 5, 6 and 7, such flared portion terminating in a vertically extending portion c^7 coacting with the vertical edge of notch b^1 in base B. If desired, screws s may be utilized for effecting connection between cabinet C and base B, Figs. 6 and 7.

Suitable supporting members, as the Z-shaped angles 1, Fig. 5, are welded or otherwise suitably secured to the interior surface of the front wall c^1 of the cabinet, preferably immediately adjacent each end thereof. Suitably secured to members 1, as by screws 2 or the like is the angular bracket or supporting frame F comprising, as viewed in Figs. 6 and 7, a vertical extending panel or plate 3 and a horizontally extending shelf or ledge 4. Preferably, frame F constitutes the sole support for the condenser, transformer and other structure comprised in the receiving set, as hereinafter more fully described.

Upon the panel 3 are mounted several variable adjustable tuning devices, such as variable inductances, or, and preferably, as indicated, variable tuning condensers for tuning two or more circuits of the receiving set.

In the example illustrated, three variable condensers K, K^1 and K^2 are mounted upon the panel 3 and have their rotors or adjustable elements mechanically coupled for simultaneous adjustment in unison by a single knob or handle on the outer side of the front wall or side c^1 of the cabinet C. By preference, the condensers aforesaid are of the character described and claimed in my copending application, Serial No. 104,262 filed April 24, 1926.

As illustrated, condensers K, K^1 and K^2 are duplicates, or substantially so, with the exception that the middle condenser K^1 has a longer rotor shaft and is provided with a different type of spring mounted in a somewhat different manner for exerting an axial thrust on said shaft, as hereinafter more fully described. Each condenser comprises, as illustrated by condenser K^1, Figs. 6 and 8, a bracket or frame 5 terminating in the upper and lower horizontal shelves or ledges 5^a and 5^b, which, as described in my aforesaid application, should extend, respectively, from the vertical portion of frame portion 5 at angles of exactly ninety degrees. To the upper and lower horizontal shelves or ledges 5^a and 5^b are secured, respectively, in suitable manner, as by one or more rivets 6, the members or plates 7 of insulating material, as a phenol condensation product, hard rubber, a fabric, as linen or canvas impregnated in a phenol condensation product or the like. As herein shown, plates 7 are formed of impregnated canvas as described above and are secured, respectively, to the upper and lower angular portions of an arm or bracket 8 in any suitable manner, as by the screws 9 passing through the slots 9^a, Fig. 13, elongated in a direction extending at right angles from the vertical portion of frame 5 for adjustably mounting the rotor plate structure, as more fully described in my aforesaid application. Preferably, a washer plate 10 or the like is disposed on each plate 7 between the heads of screws 9 and the outer plate surface.

Bolts or screws 11 passing, respectively, through bracket 8 adjacent its angularly disposed arms support the stator plates 12 held in spaced relation thereon by washers 13 or the like. Exteriorly of bracket 8, the lower bolt 11, as viewed in Figs. 6 and 8, receives a pair of nuts 14 or the like. Between the nuts 14 on the lower respective bolts 11 of condensers K and K^1 the neutralizing grid resistances 15 may be secured and to the lower bolt 11 on condenser K^2 the grid leak condenser 16, Fig. 4. Onto the upper bolt 11, of condenser K^1, as viewed in Fig. 6, there is likewise threaded a pair of nuts 14 between which may be received a lug or terminal 17. Similarly, the upper bolts 11 of each of the condensers K and K^2 may carry on their respective ends a pair of nuts between which are received lugs corresponding with the lug 17.

A bearing member 18, which should extend at right angles from frame 5 is suitably mounted in an opening or perforation therein as by peening the end of said member onto the adjacent portion of frame 5, as indicated at 18^a, Figs. 6 and 8. Mounted in bearing member 18 is a shaft 19 carrying the rotor plates 20 held in spaced relation thereon by washers 21, said rotor plates interleaving with the stator plates 12. Each rotor shaft 19 comprises a conical bearing 19^a and a reduced portion 19^b. As clearly indicated in Fig. 8, shaft 19 has two bearing surfaces on member 18, namely, in the region where conical bearing 19^a engages the tapered end of member 18 and where another portion of shaft 19 engages the reduced diametrical portion 18^b of member 18. Due to the provision of the reduced portion 19^b of shaft 19 which lies between the two bearing surfaces aforesaid, the friction between the parts is reduced and shaft 19 is more readily maintained in the proper aligned position. If desired, each rotor shaft 19 may be provided with a counter balance weight 19^c.

As indicated in Fig. 3, panel 3 is provided with a plurality of apertures 22 of substantial diameter formed concentrically with respect to the respective rotor shafts 19.

For the middle condenser K^1 there is provided a bowed spring 23, Fig. 11, having a centrally disposed perforation through which freely extends the rotor shaft 19 of that condenser when spring 23 is mounted thereon and lies in a perforation 22, Figs. 6

and 8. When thus mounted, spring 23 engages a washer 23^a in turn engaging a pulley secured to said shaft for exerting thereon a longitudinal thrust toward the left, Fig. 8, to bias conical bearing 19^a into engagement with its seat in the end of member 18 whereby the rotor plates 20 are properly positioned within the stator plates 12.

For each of the end condensers K and K^2 there is provided a bowed spring 24, Fig. 12, having a centrally disposed key-shaped slot through the larger diametrical portion of which extends the rotor shaft of a condenser K or K^2. After spring 24 has been passed along an end condenser rotor shaft 19 to the position indicated in Fig. 15, it may be moved transversely of said shaft to position the periphery of the smaller diametrical portion of the aforesaid key-shaped slot in a circumferential groove 24^a in said shaft. When thus positioned, spring 24 exerts an axial thrust directly on its associated shaft to move the same toward the left, Fig. 15, for the purpose noted above with respect to spring 23. Secured to each rotor shaft 19 of condensers K and K^2 is a pulley whose interior surface, however, is not engaged by spring 24.

If desired, rotation of springs 23 and 24 with respect to their respective shafts may be prevented by providing a lug or projection 24^b on each condenser frame 5 received in an opening or aperture 25^a at or adjacent each spring end.

Each rotor shaft 19 of condensers K and K^2 terminates in the space between panel 3 and the front wall c^1 of the cabinet, while the shaft of condenser K^1 extends exteriorly of the cabinet where there is attached thereto the operator's knob or handle h, with which may be associated a dial h^1 bearing suitable graduations co-acting with the marker or index h^2 on the front cabinet wall c^1.

Secured in any suitable manner upon the rotor shaft 19 of the condenser K^1 between the front wall c^1 of the cabinet and frame 5 is the drum or pulley 27 of any suitable insulating or conducting material, as occasion may require. In the example illustrated, the pulley 27 is of metal. Secured in any suitable manner, as by the set screws 28 or the like, upon the respective shafts 19 of condensers K and K^2, are the similar drums or pulleys 29 and 30, disposed between front cabinet wall c^1 and frame 5.

Passing over the pulleys or drums 29 and 27 is the belt or band 31, and passing over the pulleys or drums 30 and 27 is the belt or band 32. The members 31 and 32 may be of any suitable material, metallic or otherwise; in the example illustrated, they are ribbons of brass, phosphor bronze or the like.

To ensure that the several rotors of the different condensers be maintained always in the same angular positions with respect to each other throughout their adjustments, there are provided means for preventing creeping or slippage of the bands or belts 31 and 32 with respect to the pulleys with which they engage. Such means may be of any suitable character, and, in the example illustrated, comprises pins 33, 33 on the pulleys 27 and 30, extending radially from their belt or band-engaging surfaces and extending through closely fitting apertures in the band 32. Similarly, pins 34, 34 are provided on the pulleys 27 and 29 and extend through closely fitting apertures in the belt 31.

Suitable stop structure may be provided for limiting the extent of rotation of the condenser rotors. For example, it is desirable to thus restrict such rotation when the rotor plates have been moved to positions either wholly within or wholly without the stator plates. To this end, there may be utilized the counter-balance weight 19^c on shaft 19 of the middle condenser K^1 in conjunction with suitable stop structure herein disclosed as comprising a bracket 35 or the like, suitably secured, as by a spot-welding operation, to the interior surface of the plate or bracket 5 of condenser K^1 below the rotor shaft 19. By providing two or more inwardly extending prongs or lugs 35^a on plate 5, bracket 35 may be secured in predetermined position thereon when correspondingly positioned openings on said bracket receive the lugs 35^a aforesaid, Fig. 10. Bracket 35, in the example shown, comprises three angularly extending arms or flanges 35^b. Rising from the centrally-disposed flange 35^b is a lug or projection 35^c entering an aperture in a member 36, preferably of resilient material, resting upon the centrally-disposed flange 35^b and passing beneath the similar flanges at the end of bracket 35.

The ends of member 36 are positioned in the path of counter-balance weight 19^c and, preferably, such ends are upturned as indicated at 36^a, Fig. 10.

As described in my aforesaid application, due to the configuration of the rotor plates, there results an unequal distribution of weight and to counteract this, the counter-balance 19^c should be non-symmetrically arranged on the rotor shaft with respect to the rotor plates. Accordingly, when so arranged, to restrict rotation of the rotor plates, either when wholly within or wholly without the stator plates, bracket 35 and member 36 should be tilted, as indicated in Fig. 10.

Constructional features involving the mechanism herein disclosed to effect coupling of the rotors of the tuning condensers is described and claimed in my co-pending

application Serial No. 79,100, filed January 4, 1926.

Carried by the shelf 4 of the frame F and suitably secured thereto, as by bolts 36 is a member or plate 37 of insulating material, as a phenol condensation product or hard rubber. As shown in Figs. 5 and 6, plate 37 overlies the condenser structure comprising the units K, K^1 and K^2 and forms a support for the radio frequency transformers T, T^1 and T^2 each of which in the example shown comprises a cylindrical core or shell 38 on which is wound or coiled a primary P and a secondary S, a layer of suitable insulating material 39, as varnished paper, intervening between the two coils P and S.

Transformers T, T^1 and T^2 may be secured to plate 37 in any suitable manner. To this end, and as one manner of so doing for each transformer, I may attach a bracket 40 preferably of non-magnetic material, as brass, to plate 37 by bolts 40^a or the like. By grooving the ends of the bracket arms, as indicated at 40^b, Fig. 14, the respective cores 38, may be rigidly clamped or secured in position by a bolt 41 or the like passing through the arms of each bracket.

Plate 37 may also support terminals or binding posts 42 and 43 adapted to be connected, respectively, to the antenna or open absorption path and to ground or counter-capacity. Preferably, terminals 42 and 43 rise from the same side of plate 37 as do the transformers T, T^1 and T^2. Terminal 42 extends through plate 37 and is connected to and secures a flexible clip 44 or the like to plate 37. Terminal 43 preferably extends through shelf 4 and plate 37 and is connected to a lug 45 or the like to which there is secured in conductive relation a coil or winding 46, Fig. 5, utilizable as an auto-transformer, for example, in the manner described in Miller application, Serial No. 73,091, filed December 4, 1925. A flexible clip 47 is riveted or otherwise suitably secured to plate 37 and in the example shown is interposed between said plate and winding 46. Similar flexible clips 48 and 49 are likewise suitably secured to plate 37 in substantially symmetrical relation with respect to clips 44 and 47.

Each of the clips aforesaid, adjacent the rivets or other devices securing the same to plate 37 comprise portions angularly related with respect to the clip portions lying on said plate to which angular portions may be respectively soldered or otherwise suitably secured conductors or wires, not shown. At their other ends, each of said clips comprise substantially similar angular portions, respectively, overlying in part the holes or perforations 50 in plate 37 through which extend the prongs or terminals of a thermionic vacuum tube which may be utilized as a coupling tube, for example, in the manner described in the Miller application aforesaid. It will be observed that the relation of parts is such that wiping contact is effected between the angular portions of clips 44, 47, 48 and 49 and the tube prongs thereby effecting good electrical contact between the co-acting elements and effectually holding the tube in position on member 37. It will also be observed that one pair of the perforations 50 are of greater diameter than the other pair. Accordingly, upon proper selection of the diameters of the tube prongs, it results that the tube may be associated with clips 44, 47, etc., only when occupying one predetermined position, and, as a result, the same elements of the tube will always be brought, respectively, into a conductive relation with the same clips.

As herein shown, two other similar groups of clips similar to those described above are arranged in suitable spaced relation on plate 37 for the reception of the radio frequency amplifying tubes. Said groups comprise, respectively, the clips 51, 52, 53 and 54 associated, respectively, with the groups of perforations 55, Fig. 5.

Carried on one face of the shelf 4 and preferably secured thereto by one or more of the bolts 36 is a condenser 56, Fig. 5, of suitable construction utilizable for by-passing radio frequency currents around the source of power in the plate filament circuit.

Carried by the shelf 4 of frame F and suitably secured thereto, as by bolts 57, is a second member or plate 58 which may be formed of material corresponding with plate 37 but preferably is of greater width. As herein shown, three similar groups of clips similar to those described above are arranged in suitable spaced relation on plate 58 for the reception of a detector and two amplifying tubes. In the example shown, said groups comprise, respectively, the clips 59, 60, 61 and 62 associated, respectively, with the groups of perforations 63, Fig. 5. If desired, and this construction may be utilized with those clips on plate 37, the clips 59, 60, etc., may be maintained in proper spaced relation by knobs or projections 64 formed preferably integrally with plate 58 and rising between said clips.

Carried by plate 58 are a pair of spring clips 65 connected by conductors, not shown, in the output circuit of the last tube in the audio frequency series. To these clips may be connected the cords or conductors leading to a signal-indicating instrument, as a telephone, loud-speaker, or the like.

As herein shown, a suitable detector plate by-pass condenser 66 is associated with plate 58. Ordinarily, condenser 66 need not be secured to plate 58 since the conductors connecting the same in the desired circuit rela-

tion are usually of sufficient rigidity to retain it in the proper position. A grid leak resistance 67 may be supported on or adjacent plate 58 in a similar manner, or otherwise, as suitable or desirable.

Shelf 4 is provided with a number of holes or perforations 68 of different sizes through which pass the conductors, not shown, to various parts of the apparatus, said conductors preferably diverging from a cable 69 passing beneath a U-shaped bracket 70 secured to shelf 4.

On the opposite side of shelf 58 are mounted the audio-frequency transformers T^3 and T^4 and are preferably secured thereto by the bolts 57 terminating on the top surface of ledge 4, Fig. 7.

On the front of panel 3 and covering an aperture A therein is secured a structure R comprising a resistance element or rheostate, not shown, adjustable by a knob or handle 71 and a switch-actuating member 72 utilized for controlling the circuit of the battery or other current supply for the filaments or cathodes of the tubes comprised in the set.

Referring to Figs. 3 and 9, panel 3 of frame F is shown as provided with a plurality of apertures each receiving a stud 73 or the like formed on the frame 5 of condenser K^1 whereby the latter may be accurately located in predetermined portion. On each side of condenser K^1, panel 3 is provided with horizontally aligned pairs of elongated notches, those at the left, as viewed in Fig. 3, receiving studs 74 formed on the frame 5 of condenser K^2 and those at the right receiving similar studs 75 formed on the frame 5 of condenser K. Panel 3 is also provided with elongated slots as indicated by the broken lines in Fig. 3 through which pass the screws, bolts or the like 76 for securing the frames 5 of condensers K and K^2 to panel 3. If desired, washer plates 77 may be utilized in effecting this connection. Since condenser K^1 is preferably non-adjustably fixed in position, screws 78 for connecting panel 3 and the frame 5 of that condenser need pass only through non-elongated openings in said panel of but slightly greater diameter than the external diameter of the screws. With a construction of this character, after loosening screws 76 condensers K and K^2 may be readily adjusted toward or from condenser K^1 in a horizontal direction, Fig. 3, to place the bands 31 and 32 under proper tension.

Panel 3 adjacent its ends may likewise be provided with the slotted portions elongated in a horizontal direction, Fig. 3, for receiving the screws 2 which secure said panel to brackets 1. With this construction, panel 3 may be adjusted in a horizontal direction within cabinet C to permit structure R and rotor shaft 19 carried by said panel to be readily passed through the proper apertures in the front wall c^1 of the cabinet. The feature of adjusting bodily a condenser along a panel on which it is mounted as, and for the purpose, above described, and of adjusting a mounted panel with respect to a housing within which it is disposed, as above described, is claimed in my co-pending application Serial No. 244,605, filed January 5, 1928.

In the preferred embodiment of my invention, to form the cabinet there is first obtained a flat sheet of metal and by a suitable operation, a number of openings or apertures of variable size are provided therein. In the example illustrated, there are individual openings for the rotor shaft of condenser K^1, structure R, prongs of index h^2, the two conductors leading, respectively, to ground or counter-capacity and the antenna or open absorption path, the conductors leading to the signal-translating device, and for the cable 69. In addition, there should be provided openings in the rear cabinet wall adjacent the end walls through which a screw driver or the like may be passed for manipulating the screws 2 securing panel 3 to brackets 1. Those of the various openings or apertures aforesaid through which conductors pass may have their peripheries rounded or turned to prevent damage to the insulating or covering material of the conductors.

Thereupon by a suitable operation, the sheet of metal is so manipulated as to yield the cabinet, box or the like C illustrated in the drawings, through the open side of which may be passed the frame F carrying all of the various pieces of apparatus with the possible exception of the vacuum tubes. When frame F is properly secured within the cabinet, as to the brackets 2, and with the cabinet in its normal position, that is, with the wall c^5 forming the top thereof, the ledge or shelf 4 lies adjacent said wall c^5, and the audio-frequency transformer T^3 and T^4 occupy inverted positions.

If the vacuum tubes have not previously been secured to the plates 37 and 58, those to be secured to plate 37 may now be passed through the elongated slot b^2, Fig. 6, in base B, and the prongs or terminals thereof inserted through the proper groups of openings 50 or 55 and into engagement with the respective spring clips associated with each opening in said groups. In like manner, those vacuum tubes to be secured to plate 58 may be passed through the elongated slot b^3, Fig. 7, and the terminals thereof respectively associated with the proper spring clips adjacent the openings in the various groups 63 thereof. With this construction, it will be observed that when the cabinet is

in its proper position the vacuum tubes contained there occupy inverted depending positions as indicated in Fig. 7.

A metallic cabinet of the character hereinafter described presents certain advantages over the types heretofore utilized. For example, the construction thereof may be expeditiously performed with but a minimum outlay of time, labor and expense. Further, an all-metallic cabinet of this character acts as a shield and prevents absorption of undesired magnetic disturbances, such, for example, as might be taken up by one or more of the radio frequency transformers. As an instance of this character, the metallic cabinet structure tends to prevent absorption by one or more of the radio frequency transformers of signal waves transmitted by a local or nearby station while the set is receiving signals from a more distant station.

Referring to Fig. 8, there is illustrated a modified form of my invention comprising a base B^1, which may be of material corresponding with that from which the cabinet C is formed, or otherwise, as desired. Base B^1 may be provided with a circumferential flange portion forming a groove or channel b^4, with which co-acts the vertical portion c^7 of the cabinet. By preference, base B^1 and cabinet C are secured together in suitable manner, as by the bolts or screws 79. There may be disposed along the bottom of base B^1 a layer of felt or the like b^5 for protecting the finish of the table or other structure upon which the set is supported. Likewise, the bottom of the base B^1 may be provided with elongated slots or openings, as slot b^6, through which may be passed the vacuum tubes carried by the plates 37 and 58.

Radio receiving apparatus of the character aforesaid, particularly the circuits in which the various pieces of apparatus are connected, conforms generally with the disclosure of my prior application Serial No. 79,100, filed January 4, 1926. It shall be understood, however, that an important feature of my invention resides in the provision of a one piece cabinet, preferably metallic, and particularly of the character hereinbefore described when utilized as a housing or enclosure for any type of radio receiving apparatus, which may be of a structure substantially different from that herein disclosed.

What I claim is:

1. Apparatus of the character described, comprising a base having an opening therein, a one-piece cabinet supported thereon, radio receiving apparatus enclosed by said cabinet and base, and a panel secured substantially parallel with and in spaced relation to a wall of said cabinet forming the sole support for said apparatus, said panel having mountings for supporting in depending position components of said apparatus including vacuum tubes inserted through said base opening.

2. Apparatus of the character described, comprising a one-piece metallic cabinet, panel structure spaced from walls of said cabinet, extending in two planes at substantially right angles to each other, and comprising a shelf terminating in a plurality of members of insulating material enclosed by said cabinet, and radio receiving apparatus dependent from both of said members.

3. In combination, a cabinet comprising a base having an opening therein, radio receiving apparatus enclosed by said cabinet and base, and a panel secured to a wall of said cabinet and having inverted mountings for apparatus including vacuum tubes inserted through said base opening.

4. Apparatus of the character described, comprising a one-piece metal cabinet having an open bottom, a panel spaced from and substantially parallel with a wall of said cabinet, a shelf of insulating material secured to said panel and spaced from another wall of said cabinet, and contact structure carried by said shelf to engage vacuum tubes inserted through said open bottom.

5. Apparatus of the character described, comprising a one-piece metal cabinet having an open bottom, a panel secured to and spaced from a side wall of said cabinet, a shelf of insulating material fastened to said panel and disposed adjacent the top wall of said cabinet, and means carried by said shelf to engage and support in inverted position vacuum tubes inserted through said open bottom.

6. Radio receiving apparatus comprising a housing having an open bottom, a panel substantially parallel to a wall of said housing and having a shelf parallel with the top of said housing and spaced therefrom, tuning structure carried by said panel, and means carried by said shelf to support in inverted position vacuum tubes inserted through said open bottom.

7. Radio receiving apparatus comprising a housing having an open bottom, a panel spaced from the walls of said cabinet and extending in two planes substantially at right angles to each other and comprising a shelf, and means carried by said shelf to support vacuum tubes inserted through said open bottom.

8. Radio receiving apparatus comprising a housing, a panel carried by said housing having a shelf parallel with and spaced adjacent to the top of said housing, and means carried by said shelf to support vacuum tubes in inverted position.

9. Radio receiving apparatus, comprising a housing, a panel having portions spaced from and adjacent the top and side walls

of said housing respectively, tuning structure carried by said portion adjacent the side wall, and contact structure carried by the portion adjacent said top to effect engagement with vacuum tubes in inverted position.

10. Radio receiving apparatus comprising a housing having an open bottom, radio receiving apparatus enclosed by said housing, and a panel secured substantially parallel with and in spaced relation to a wall of said cabinet forming a support for said radio receiving apparatus, said panel having mountings for supporting in depending position components of said radio receiving apparatus including vacuum tubes inserted through said open bottom.

ARTHUR ATWATER KENT.

CERTIFICATE OF CORRECTION.

Patent No. 1,658,562. Granted February 7, 1928, to

ARTHUR ATWATER KENT.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 18, for the word "vertical" read "vertically"; page 5, lines 20 and 21, for the word "rheostate" read "rheostat"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of May, A. D. 1928.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.