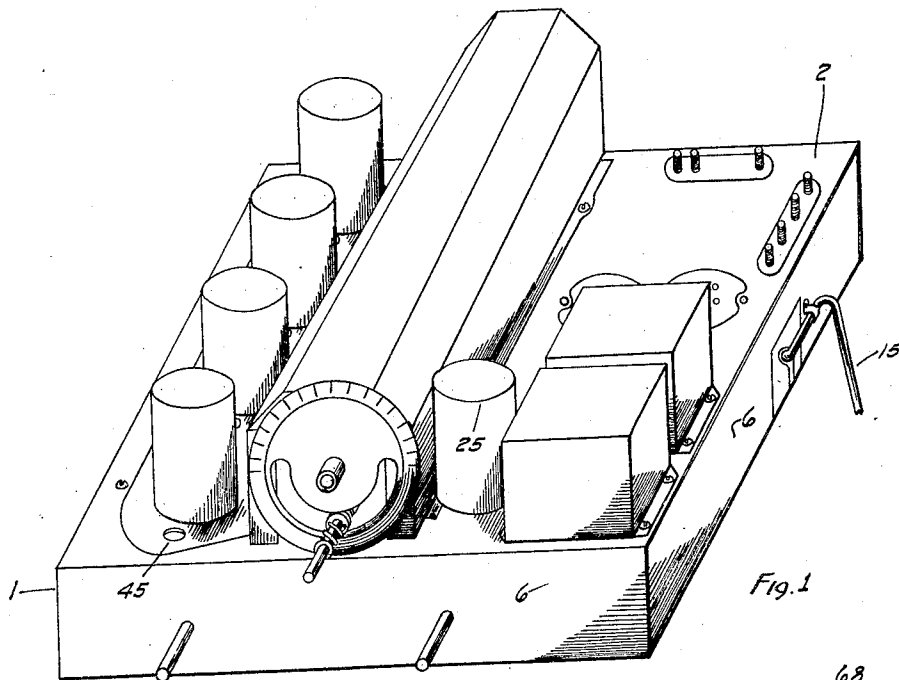
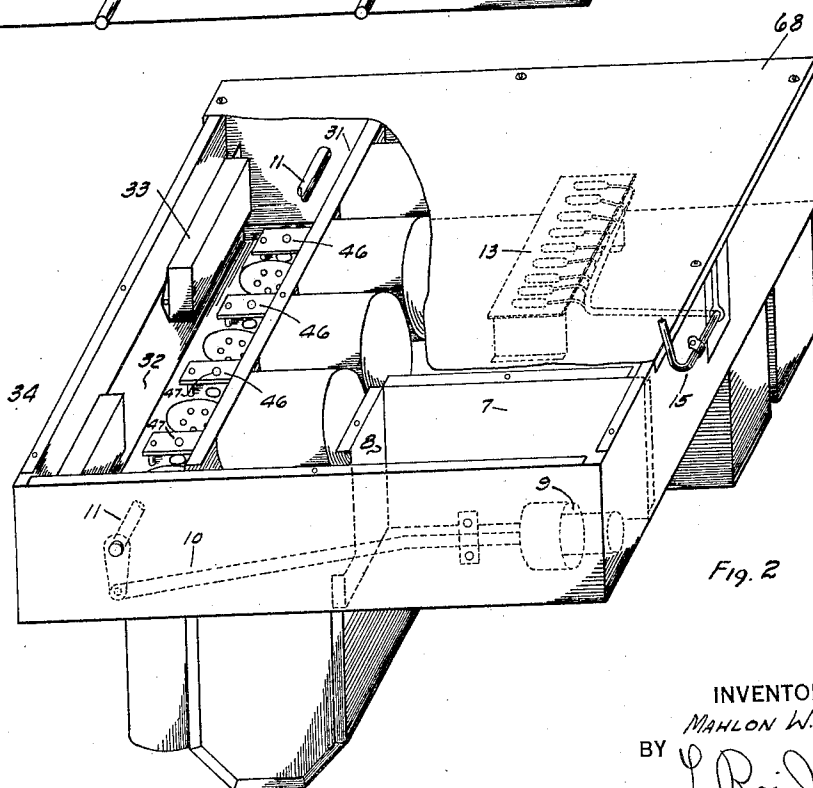


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M. W. KENNEY
RADIO APPARATUS
Filed Dec. 12, 1929

1,909,685

2 Sheets-Sheet 1



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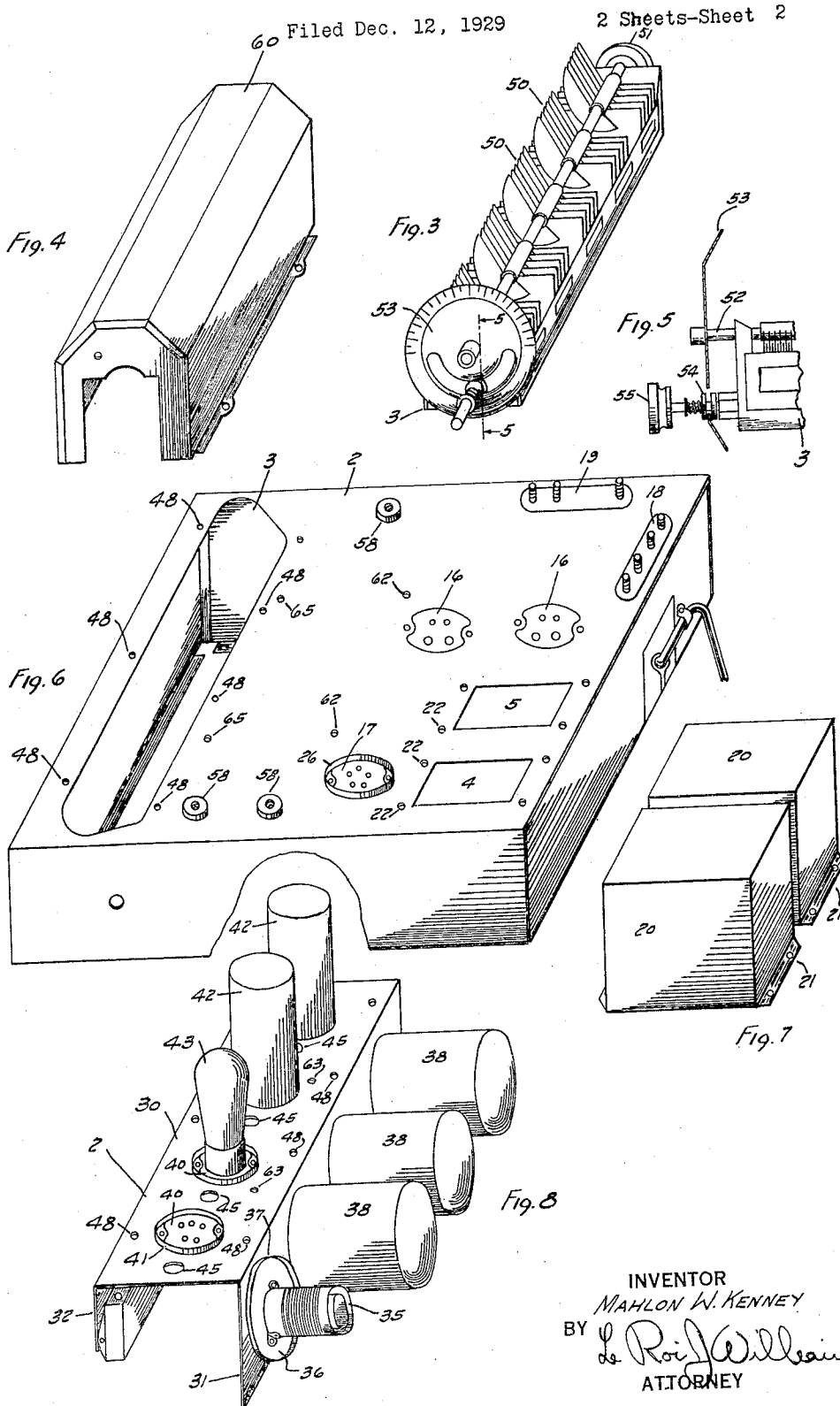
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RADIO APPARATUS

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This invention relates to radio chassis and to methods of assembling them. The chassis in this case primarily consists of a supporting base or member upon which the component elements of a set may be supported. In the illustrated form, the set comprises a complete receiver excepting the tubes, power supply and speaker. Obviously, however, any or both of these units may be added to the set and supported on the chassis, if desired.

In order to efficiently manufacture and assemble complete radio chassis, particularly in large quantity production, it is essential that the process of assembly be reduced to the most elementary details in order to make use of relatively unskilled labor. It is also desirable that the chassis as a whole be subdivided into small independent units which may be individually and, if desired, simultaneously assembled. Such a procedure allows frequent testing of relatively simple units with the speedy and economical elimination of defective parts, and makes possible production in larger quantities because of the use of such methods.

A further advantage lies in the fact that the rough handling incident to quantity production is limited mainly to compact units which may readily withstand such handling. Obviously, the servicing of such a chassis is simplified upon the determination of the trouble by the comparatively ready removal of a unit and the substitution of a new one. As is well known, radio sets are complicated and their parts rendered relatively inaccessible because of the close proximity of the various parts and the unavoidable maze of wiring. By subdividing the set into component units, each of which may be assembled or disassembled in a comparatively simple manner, it is obvious that compactness of apparatus or complexity of wiring will have but little effect on the servicing of such a set, since the defective unit may be removed and replaced as such.

Referring to the drawings,

Fig. 1 shows a perspective view of a preferred form of complete chassis;

Fig. 2 is a bottom view of the chassis with

a portion of the bottom cover-plate broken away;

Fig. 3 is a perspective view of a tuning control unit with its housing removed;

Fig. 4 is a view of the housing for the control units shown in Fig. 3;

Fig. 5 is a view on 5—5 of Fig. 3;

Fig. 6 is a view of the chassis supporting member with certain of the apparatus removed;

Fig. 7 is a view of two transformers in their housings, which are adapted to be mounted on the chassis member shown in Fig. 6; and

Fig. 8 is a view of a preferred form of radio-frequency unit showing two of the tube shields and one of the transformer shields removed and a vacuum tube plugged into one of the sockets.

The entire chassis preferably consists broadly of a chassis supporting base 1 having certain apparatus mounted thereon and comprising a unitary sub-assembly. Base 1 comprises a pan having a plate number 2 provided with openings 3, 4, and 5, as well as smaller apertures for screws and wires and provided with sides 6. In the preferred form mounted within the pan and shielded by walls 7 and 8, is an antenna tuning element generally designated as 9 and adapted to be manipulated by a leverage system 10 and shaft 11 passing through the sides of base 1. The antenna tuning unit may be any one of several well-known constructions.

Secured to the inside of the pan are various pieces of apparatus, excluding audio-frequency transformers, which are employed in detector and audio-frequency circuits. Part of this apparatus is shown in Fig. 2 in dotted lines as mounted on a shelf 13 and connected to a cable 15 for connection to independent apparatus, such as power units and the like.

Fig. 6 shows a plurality of vacuum tube sockets 16 and 17 mounted on the inside of the pan and registering with apertures in plate 2 so that the vacuum tubes may be plugged in from the outside. A plurality of terminal posts 18 and 19 are provided for connection to apparatus such as speakers and antenna.

Secured over openings 4 and 5 in plate 2

are a plurality of audio-frequency transformers 20 completely enclosed in metallic housings. The housings are mounted on plate 2 by flanges 21 having apertures registering with apertures 22 in plate 2, and adapted to be bolted thereon. This assembly comprising the audio-frequency and antenna tuning unit is substantially complete in itself. A tube shield 25 shown in Fig. 1 is fitted over a flange 26 surrounding sockets 17 before the chassis is finally disposed of. Obviously, the same means may be provided for sockets 16, if found desirable.

It is evident that this unitary sub-assembly is sturdy since at all stages of the assembly all the parts are completely protected. Thus, the apparatus mounted within the pan and secured thereto is protected by sides 6 of the pan, while transformers 20 secured to the outside of the pan are completely protected by their metallic housings.

The radio-frequency unit shown in Fig. 8 is assembled on a base member 2, which is preferably U-shaped, having an intermediate portion 30 and side portions 31 and 32. On the inside of this U-shaped member are mounted various apparatus useful in radio-frequency circuits, such as condensers 32 and 34 and the like. On the outside portion of 31 are mounted a plurality of radio-frequency transformers 35. These transformers may be of any desired construction and are preferably mounted on circular metallic bases 36 having peripheral flanges 37. When these transformers are mounted, metallic shields 38 are fitted over flanges 37 and serve to protect the delicate transformers against mechanical injury. They also function as electrostatic shields during the operation of the transformers.

Along portion 30 of the U-shaped member 2 are mounted a plurality of vacuum tube sockets 40 having metallic flanges 41 around them adapted to engage shielding caps 42. A vacuum tube 43 is shown as plugged into one of the sockets, although in the course of assembly vacuum tubes and shields 42 are not provided. Adjacent each of the sockets 40 are apertures 45, below which may be mounted a plurality of neutralizing condensers 46. These condensers may be varied by means of a centrally located adjustment 47 passing through each condenser and in registry with each of apertures 45. The particular details of construction of these condensers are of no consequence. The condensers shown are useful for introducing a neutralizing capacity to balance the capacity of the vacuum tubes and, as such, must be adjusted with the set in operation. This is conveniently done upon the complete assembly of the entire set by the insertion of a proper tool such as a screw-driver or a socket wrench through apertures 45 and into en-

gagement with the capacity adjusting means 47.

It is obvious that the entire wiring for the radio-frequency unit may be disposed on the inside of the U-shaped member 2. This entire radio-frequency unit is fabricated and assembled as an independent unit. It is clear that during the assembly thereof all parts are protected against mechanical abuse, either because of metallic shields 38 or because of the disposition of such parts on the inside of said mounting member.

Upon the completion of the radio-frequency unit, it is inserted from the bottom of pan 1 and secured to plate 2 over opening 3. Shaft 11 of the antenna tuning apparatus must be out of the way when this is done. In practice, this shaft is not inserted into place until after the radio-frequency unit has been in position. The radio-frequency unit is secured by disposing intermediate portion 30 to cover opening 3 in plate 2 and is maintained in place by bolts or other suitable fastening means passing through a plurality of registering apertures 48.

As clearly shown in Fig. 2, substantially all the radio-frequency apparatus is within pan 1 to be mechanically and electrically shielded thereby. Upon the mounting of the radio-frequency unit on plate number 2 suitable electrical connections are made between the two units.

It is obvious that during the assembly of the apparatus within pan 1 and before the mounting of the radio-frequency unit on pan 1, there is plenty of space available within the pan so that the various pieces of apparatus may be manipulated and numerous connections made. The subsequent mounting of the radio-frequency unit results in an effective utilization of free space within the pan without the accompanying inconvenience of the lack of space during the assembly of each unit. This makes the finished product compact and provides for complete mechanical and electrical shielding as well as a covering for the apparatus against dirt.

An independent tuning unit shown in Fig. 3 preferably comprises a plurality of condensers 50 and rheostat 51, assembled upon a base 3. The condensers are shown as mounted in a gang on a common shaft 52 carrying a dial 53. A micrometric actuating means comprising a grooved member 54 engaging a slotted edge of dial 53 and actuated by a knob 55 is mounted on base 3 in a well-known manner. If desired, small variable condensers for equalizing the individual condenser units may be mounted, in the conventional manner, upon base 3. The control unit is mounted upon plate 2 by suitable bolts in base 3 engaging threaded bushings 58 and is completed by a housing 60 which is fitted over the unit and secured by bolts passing through apertures 62 and 63 in plate 2. A plurality of

apertures 65 are provided in plate 2 for connections from the radio-frequency unit to the control unit. Inasmuch as these apertures are within housing 60 the wires may be directly
 5 ly connected to the control unit without any special provision therefor in the housing. This chassis is completed by a bottom cover plate 68 suitably bolted to pan 1.

It will be noted that the control unit is
 10 parallel and adjacent the radio-frequency unit, thus making for short connections between said units.

While I have shown preferred embodiments of my invention it will be obvious that
 15 various modifications may be made without departing from the spirit and scope as defined by the appended claims.

What I claim is:

1. A radio chassis comprising three distinct bases, apparatus directly secured to one base, radio frequency and control apparatus respectively directly secured to each of the other two bases, one of said bases comprising a rectangularly shaped pan, said pan having
 25 large individually shielded elements on the outside thereof and wiring terminal boards and small elements on the inside thereof, and means for securing each of the other two bases on the inside and outside of said pan respectively.

2. A radio chassis comprising three distinct bases, audio-frequency and antenna tuning apparatus directly secured to one base, radio frequency and control apparatus respectively directly secured to each of the other two bases, one of said bases comprising a rectangularly shaped pan, said pan having large individually shielded elements on the outside thereof and wiring terminal
 40 boards and small elements on the inside thereof, and means for securing each of the other two bases on the inside and outside of said pan, respectively, and parallel to each other.

3. A radio chassis comprising a supporting
 45 pan having substantially rectangular sides and a bottom and having an opening in the bottom thereof, said pan having large individually shielded elements on the outside thereof and wiring terminal boards and
 50 small elements on the inside thereof, audio-frequency and antenna tuning apparatus directly secured to said pan on the bottom, a base, radio frequency apparatus directly secured to said base, means for securing said
 55 base to said pan over said opening and parallel to an edge of said pan, another base, control apparatus directly secured to said other base, and means for securing said other base to said pan, said two bases being secured
 60 on the opposite sides of the pan wall and parallel to each other.

4. In a radio chassis, a radio frequency sub-assembly adapted to be inserted into or removed from said chassis as a unit, said sub-assembly comprising a U-shaped mounting

member provided with a plurality of apertures and radio frequency apparatus, including a plurality of variable neutralizing condensers mounted thereon, said condensers being on the inside of said mounting member and in registry with the apertures thereof whereby said condensers may be adjusted from the outside of said member.

5. In a radio chassis, a radio frequency sub-assembly adapted to be inserted into or removed from said chassis as a unit, said sub-assembly comprising a U-shaped mounting member provided with a plurality of apertures, a plurality of vacuum tube sockets secured on said mounting member, each of said sockets being disposed adjacent an aperture, radio frequency apparatus including a plurality of neutralizing condensers mounted on said member, means for varying the capacity of each of said condensers, said condensers being secured on the inside of said mounting member, each condenser being disposed in such a manner that the capacity adjusting means is in registry with each aperture whereby the capacity of said condensers may be varied from the outside of said mounting member.

6. In a radio chassis, a radio frequency sub-assembly adapted to be inserted into or removed from said chassis as a unit, said sub-assembly comprising a U-shaped mounting member having a plurality of apertures therethrough, radio frequency apparatus including a plurality of neutralizing condensers mounted thereon, part of the radio frequency apparatus being secured on the outside of said mounting member, the rest of the apparatus including said condensers being secured on the inside of each mounting member, and means for varying the capacity of each of said condensers, said means being disposed in registry with said apertures.

7. A radio chassis comprising a pan shaped base having an opening in one wall, apparatus directly secured thereto, a second base, radio frequency apparatus directly secured thereto, means for securing said second base to said pan over the opening, all said radio frequency apparatus being within the pan, a third base, control apparatus secured to said third base, means for securing said third base to said pan adjacent the opening in said pan, said second and third bases being parallel, and a housing for said control apparatus secured to said pan and second base.

8. In a radio chassis, a pan shaped base provided with an opening in one wall thereof, apparatus directly secured thereto, a U-shaped base, radio frequency apparatus directly secured thereto, and means for securing said U-shaped base to the inside of said pan at said opening whereby all radio frequency apparatus is substantially within the pan.

9. A radio chassis comprising a pan shaped base having an opening in the bottom thereof, audio-frequency and antenna tuning apparatus directly secured thereto, part of the apparatus being within the pan and part being on the outside of the pan, said exterior apparatus including large individually shielded elements, a U-shaped base, radio frequency apparatus directly secured to said base, means for mounting said U-shaped base to the inside of said pan at the opening whereby substantially all radio frequency apparatus is within the pan, another base, control apparatus secured to said other base, means for mounting said other base on the outside of said pan, and a housing for said control apparatus secured to said pan and U-shaped member.

10. A radio chassis comprising a shallow pan having a substantially rectangular bottom, and upstanding side walls, said bottom being provided with an elongated opening along one side thereof, a U-shaped base, a plurality of vacuum tube sockets mounted on the bight portion of said U so that vacuum tubes, when plugged into said sockets, may project outwardly therefrom, a plurality of radio-frequency transformers mounted upon one of the arms of said U, said transformers being mounted in line so that they project outwardly from said U, means for mounting said U-shaped base on the bottom of said pan and over said opening thereof so that the bight of the U covers said opening, and said radio-frequency transformers project inwardly toward the center of said pan, and means for mounting remaining elements of a radio receiving set on said pan and said U-shaped member.

11. The structure of claim 10 in which a gang condenser is mounted on the bottom wall of said pan adjacent said opening so that said gang condenser is disposed on the other side of said pan bottom and in line with the radio-frequency transformers.

12. The structure of claim 10 in which a gang condenser is mounted on the outside of the bottom of said pan adjacent said opening, and audio-frequency transformers are mounted on the outside of said pan bottom on the side of said gang condenser remote from said opening.

In testimony whereof he affixes his signature.

MAHLON W. KENNEY.