Jan. 26, 1943. W. P. LEAR 2,309,323

RADIO APPARATUS

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Fig. 1

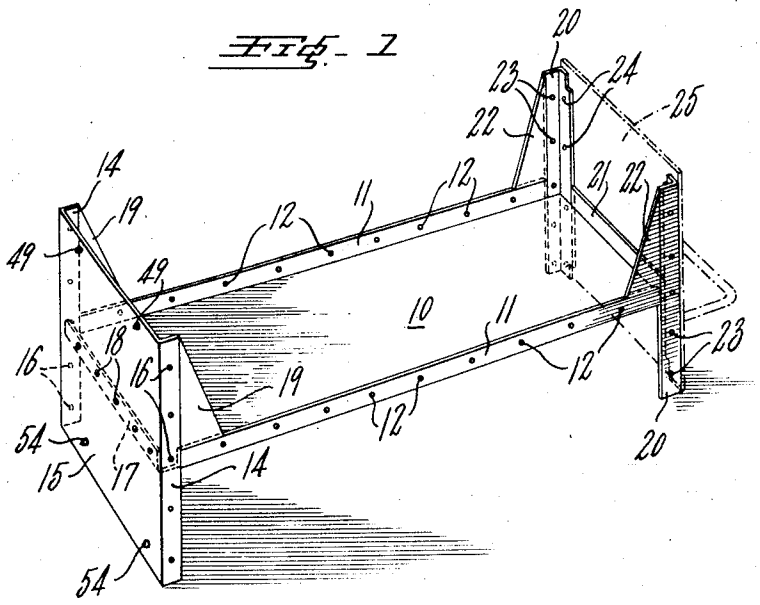


Fig. 2

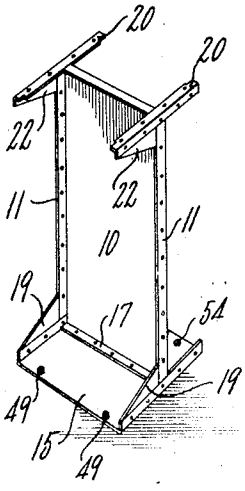


Fig. 3

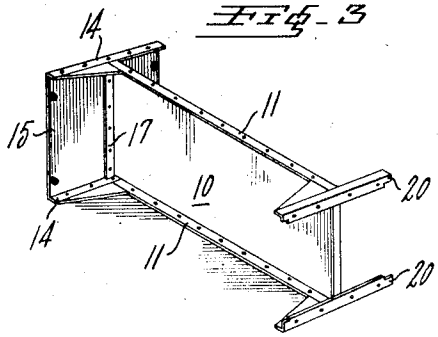
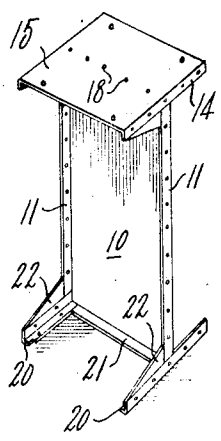


Fig. 4



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Fig. 5

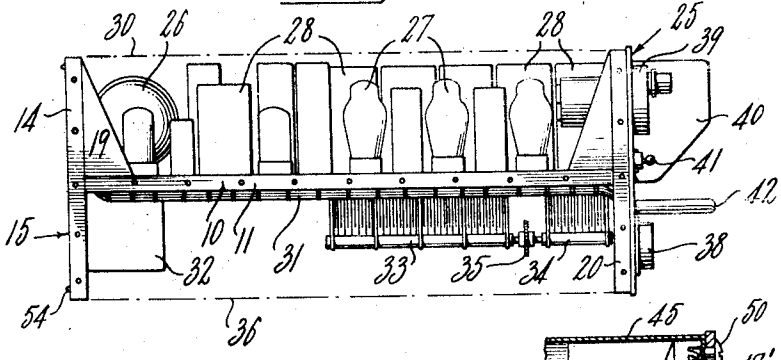


Fig. 8

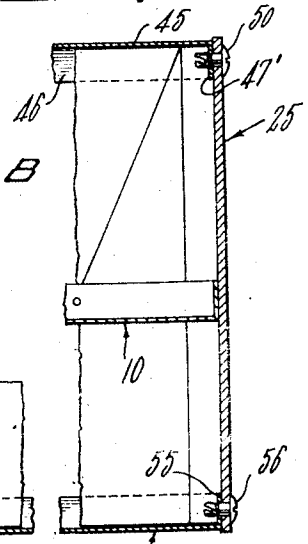


Fig. 6

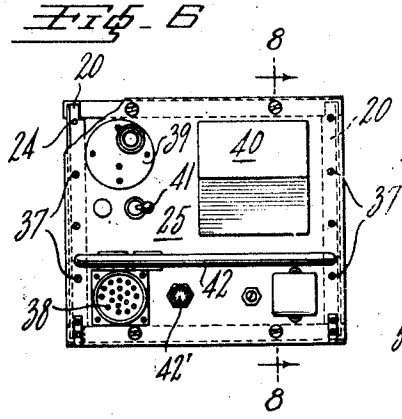
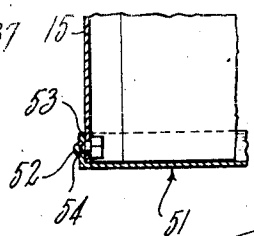


Fig. 9



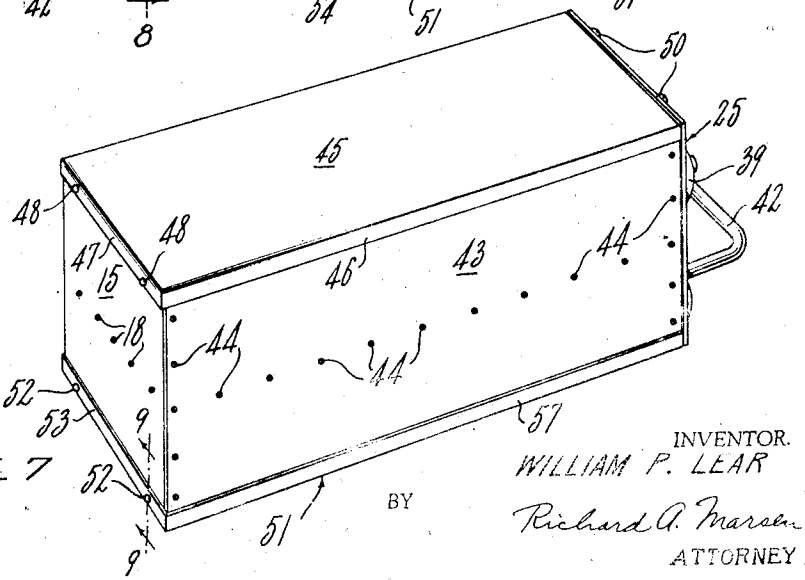


Fig. 7

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2,309,323

UNITED STATES PATENT OFFICE

2,309,323

RADIO APPARATUS

William P. Lear, Dayton, Ohio, assignor, by mesne assignments, to Lear Avia, Inc., Piqua, Ohio, a corporation of Illinois

Application August 29, 1940, Serial No. 354,653

8 Claims. (Cl. 250—16)

This invention relates to structural arrangements for radio apparatus, and more particularly to novel chassis constructions therefor.

It is among the objects of the present invention to provide novel structural assemblies embodying a plurality of mechanically and electrically related components such as radio apparatus. The invention is particularly applicable for radio receivers, radio transmitters, radio direction finders and other electronic equipment. In accordance with the invention, maximum accessibility, ease of inspection and servicing of the apparatus are provided. Also great rigidity is incorporated in the novel design thereof permitting the use of lighter weight metals in its construction for a given required strength. This factor is particularly advantageous for apparatus to be used aboard an airplane.

The novel chassis of the invention for mounting the radio components, is rigid and self-contained. The attachment of panels to the chassis assembly results in a completed cabinet for the radio set. The top and bottom panels thereof are arranged for ready removal. The side panels are also removed easily. The combined assembly forming the completed cabinet further stiffens the chassis, and constitutes a desirable and practical structural unit.

Further advantages, and objects of the invention will become more apparent in the following detailed description of a preferred embodiment illustrated in the accompanying drawings, in which:

Fig. 1 is a perspective view of the chassis.

Figs. 2, 3 and 4 are perspective views of the chassis in different positions upon a table.

Fig. 5 is an end view of the chassis, assembled with radio components.

Fig. 6 is a front view of the assembled chassis and panel.

Fig. 7 is a perspective view of the assembled chassis with the wall and cover panels.

Fig. 8 is an enlarged partial sectional view through the cabinet, taken along the line 8—8 of Fig. 6.

Fig. 9 is an enlarged partial sectional view through the cabinet taken along the line 9—9 of Fig. 7.

The chassis is shown in perspective in Fig. 1 without the radio components mounted thereon. The chassis comprises sub-base or sub-panel 10 having flanges 11, 11 along the longitudinal edges thereof. A series of threaded openings 12 are arranged in flanges 11, 11 for the attachment of side panels to be described. A channeled back plate 15 is secured on one side of sub-base 10, transverse to sub-base 10. Back plate 15 contains flanges 14, 14 projecting inwardly of the chassis, coplanar with flanges 11, 11. Threaded openings 16 in flanges 14, 14 are also for the attachment of the side panels to the chassis.

Back plate 15 is secured to sub-base 10 across flange 17 thereof containing threaded openings coacting with screws 18. Bracket plates 19, 19 are welded at the intersection of flanges 11 and 14. Sub-base 10 is positioned centrally with respect to back panel 15, in the illustrated embodiment. The relative positioning of base 10 on panel 15 depends upon the relative heights of the radio components on either side of the assembled radio apparatus, as will be described hereinafter. Back plate 15 is thus rigidly secured to the back end of sub-base 10.

A pair of vertical angle irons 20, 20 is attached to respective corners of the front end of sub-base 10. The respective sides of angle irons 20, 20 are arranged coplanar with flanges 11 and 21 of sub-base 10. Toward this end, the flanges are foreshortened at the corners so that the angle irons may properly fit therein. Angle irons 20, 20 are welded to sub-base 10 at the associated contiguous flange portions, and reenforced in position by corner brackets 22, 22 coplanar with flanges 11, 11 and the corresponding angle irons 20, 20. Angle irons 20, 20 contain threaded openings 23, 23 for accommodating the side panels, and threaded opening 24, 24 for securing front panel 25 to the chassis, as shown in dotted lines in Fig. 1.

The length of angle irons 20, 20 corresponds to the length of channels 14 of back plate 15. Also, angle irons 20 project on either side of sub-base 10 by amounts corresponding to the respective projections of the flanges 14. The chassis construction in accordance with the invention, and as illustrated in Fig. 1, is a rigid body capable of supporting components of substantial weight. In its normal horizontal position as in Fig. 1, sub-base 10 is spaced from the table by a predetermined amount corresponding to the highest radio component to be mounted on its under-side. It is to be understood that a template of openings, mounting positions, etc., is inscribed or fabricated in sub-base 10 for properly predetermining the positioning and interconnecting of the radio components to be mounted and assembled thereon.

An important feature of the novel chassis construction of the invention resides in the flexibility and ease of mounting, assembling, interconnecting and testing of the respective radio compo-

nents thereon. This is particularly important for a complex radio apparatus containing a great number of parts and circuit details. For example, the chassis may be stably positioned on its broad back plate 15, as illustrated in Fig. 2. Also, the chassis may be stably positioned on either of its sides, as shown in Fig. 3. In Fig. 4, the chassis is shown resting upon its front end, on the front sides of flanges 20, 20. In this manner, direct access to any of the many parts mounted on sub-base 10 is feasible, and the chassis may be positioned for most convenient examination or operation. This not only permits better concentration on any particular section of a large chassis assembly, but makes for improved assembly, speed and quality in production.

Fig. 5 illustrates an assembled radio apparatus embodying the novel chassis arrangement of the invention. The particular apparatus shown is the electronic section of an automatic radio direction finder receiver, containing a dynamotor 26, a plurality of radio tubes 27, a plurality of shielded radio transformer and coupling units 28, all mounted on the upper side of sub-base 10. The tallest component in the upper section of the apparatus does not reach dotted line 30 defining the position of the top panel for the chassis. The electrical interconnections of the upper components 26, 27, 28 are arranged on the under side of sub-base 10.

A connecting cable between the front and rear ends of the chassis is shown at 31. Unit 32 is a large physical component of the electronic circuit. A gang of variable radio frequency tuning condensers is shown at 33 and 34, interconnected by coupling unit 35. Dotted line 36, defining the position for the bottom panel of the apparatus, is safely below the extended position of the rotatable plates of variable condensers 33, 34. The position of sub-panel 10 with respect to the vertical sides of the chassis 14 and 20 is determined by the necessary spacing between the upper and lower components mounted thereon with respect to the top and bottom panels of the cabinet, as previously indicated.

Front panel 25 is detachably mounted to the front of the chassis by screw members 37 coacting with threaded openings 24 in angle irons 20. The edges of front panel 25 are preferably made to slightly overlap the corresponding sides of the chassis to afford a back-stop for the top, side, and bottom panels. Electrical connection plug 38, loop control motor 39, tuning band motor control unit 40, master on-off switch 41, and remote tuning cable connection plug 42' are mounted on panel 25 for mechanical and electrical interconnection with the direction finder-circuit components mounted on sub-base 10. A handle 42 is secured across the front of panel 25.

A preferred arrangement for an assembled cabinet embodying the novel chassis is shown in perspective in Fig. 7. Side panels 43 are secured thereto by screws 44 coacting with the corresponding threaded openings along coplanar flanges 11, 14 and 20 previously described. A top cover 45 is assembled thereon for ready detachment. Cover 45 contains flanges 46 overlapping the sides 43 of the cabinet, and a rear flange 47 having dents 48 arranged to fit over nibs 49 of back plate 15. Nibs 49 are preferably spring biased outwardly. A flange 47' depends from the front of cover 45 for attachment to front panel 25 by two-spaced Dzus-type fastening screws 50. A simple quarter or half turn rotation of screws 50 releases flange 47' from front panel 25 permitting lifting of cover 45, and its sliding backwards for detachment thereof from nibs 49. Such convenient and rapid removal of top cover 45 permits the cabinet to be readily opened for inspection of its upper components.

A bottom cover 51 completes the cabinet construction. Cover 51 is attached in a manner similar to top 45. Dents 52 in flange 53 of bottom 51 coact with spaced nibs 54 on back plate 15, as shown in Figs. 7 and 9. A front depending flange 55 of cover 51 coacts with two spaced Dzus-type fasteners 56, as shown in Fig. 8. Nibs 54 are preferably spring biased outwardly from back plate 15, to permit ready engagement thereof with dents 52, 52. Side flanges 57 of bottom cover 51 overlap sides 43 of the cabinet, forming a proper closure therefor.

The respective sides 43, top 45, and bottom 51, together with front panel 25, when mounted on the chassis, reenforces its strength, and forms a very stiff structure which may be subjected to any stress or mechanical vibration generally encountered in service. The respective chassis and cabinet components are preferably solid sheet metal. The rigid construction thereof permits the use of lighter metals for a given resultant strength and rigidity. Where the apparatus is used aboard an aircraft, particular advantage is had with the invention construction since aluminum or its alloys may be used therefor. Requisite rigidity and strength may thus be secured with a minimum of weight.

The respective top and bottom covers may be removed very rapidly for inspection of the inside components. Where detail servicing is indicated, side panels 43 are readily detached by removing their attaching screws. Removal of the top, bottom and side panels permits the positioning of the chassis with its components on any side thereof except the front. Detachment of front panel 25 allows stable positioning of the chassis on that side as well. It is to be understood that the chassis and cabinet construction herein disclosed may be applied to any type of electronic or radio type apparatus. Also, the relative position of sub-base 10 with respect to vertical channels 14 and 20, constituting legs of the chassis assembly, may be varied as desired.

Although a preferred embodiment of the invention has been described and illustrated, it is to be understood that modifications may be made in the structural details thereof without departing from the broader spirit and scope of the invention, as defined in the appended claims.

What is claimed is:

1. A chassis for radio apparatus comprising a plane rectangular sub-base for mounting components of the radio apparatus on either side thereof, and flanged members secured to said sub-base and extending from each of the corners thereof to form legs for both sides of said sub-base whereby the chassis bearing the components may be stably positioned on a table on any of its sides.

2. A radio set chassis of the character described comprising a plane rectangular sub-base for mounting components of the set on either side thereof, members secured to said sub-base and extending perpendicularly from each of the four corners thereof to form legs for both sides of said sub-base of substantially equal length on either side and longer than any component mounted on the respective side thereof, whereby

the chassis bearing the components may be stably positioned on a table on any of its sides.

3. A structure of the character described comprising a plane rectangular chassis for electronic parts, members secured to said chassis and extending substantially from both sides thereof and perpendicularly from each of the four corners thereof substantially equally in length on either side, whereby the structure may be stably positioned on a table on any of its six sides.

4. A structure of the character described comprising a plane rectangular sub-base with flanged edges for mounting components of radio apparatus on either side thereof, flanged members secured to said sub-base and extending perpendicularly from each of the corners thereof to form legs for both sides of said sub-base substantially equally in length on either side, whereby the sub-base bearing the components may be stably positioned on a table on any of its six sides, and angle pieces coplanar with and secured to corners formed by said flanged members and the flanged edges of said sub-base.

5. A structure of the character described comprising a plane rectangular sub-base with flanged edges for mounting components of radio apparatus on either side thereof, flanged members secured to said sub-base and extending perpendicularly from each of the corners thereof to form legs for both sides of said sub-base substantially equally in length on either side, whereby the sub-base bearing the components may be stably positioned on a table on any of its sides, angles pieces secured to corners formed by said flanged members and the flanged edges of said sub-base, and panels forming a closure for the structure, said panels being detachably fastened to the respective flanged edges of said sub-base and members for ready removal.

6. A chassis for radio apparatus comprising a plane rectangular sub-base with perpendicular flanged edges for mounting components of the radio apparatus on either side thereof, angle irons coplanar with the sub-base flanged edges and correspondingly extending from both sides thereof perpendicularly from two adjacent corners thereof, a channelled plate secured across the other two sub-base corners parallel with said angle irons and extending equally therewith to form legs for each corner of said sub-base of substantially equal length, whereby the chassis bearing the components may be stably positioned on a table on any of its sides.

7. A chassis for radio apparatus comprising a plane rectangular sub-base with perpendicular flanged edges for mounting components of the radio apparatus on either side thereof, angle irons coplanar with the sub-base flanged edges and correspondingly extending from both sides thereof perpendicularly from two adjacent corners thereof, a channelled plate secured across the other two sub-base corners parallel with said angle irons and extending equally therewith to form legs for each corner of said sub-base of substantially equal length and longer than any component mounted on the respective sides thereof, whereby the chassis bearing the components may be stably positioned on a table on any of its six sides, and angle pieces coplanar with and secured to corners formed by said angle irons and plate with the flanged edges of said sub-base.

8. A structure of the character described comprising a rectangular sub-base for mounting components on either side thereof, flanged members extending substantially from both sides thereof and perpendicularly from two adjacent corners thereof, a channelled plate secured across the other two sub-base corners parallel with said flanged members and extending equally therewith to form legs for said sub-base substantially equal in length and longer than any component mounted on the respective sides thereof, whereby the structure bearing the components may be stably positioned on a table on any of its six sides, and panels forming a closure for the structure, said panels being detachably fastened to the respective edges of said sub-base, plate and members for ready removal.

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