Feb. 10, 1942. K. EMDE 2,272,937

RADIO RECEIVING APPARATUS

Filed June 11, 1941 2 Sheets-Sheet 1

Fig. 1.

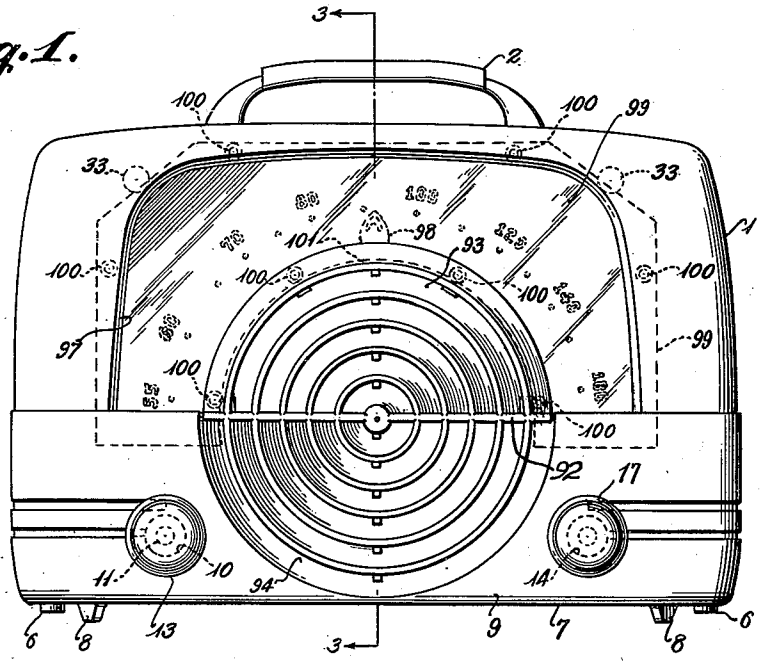

Fig. 2.

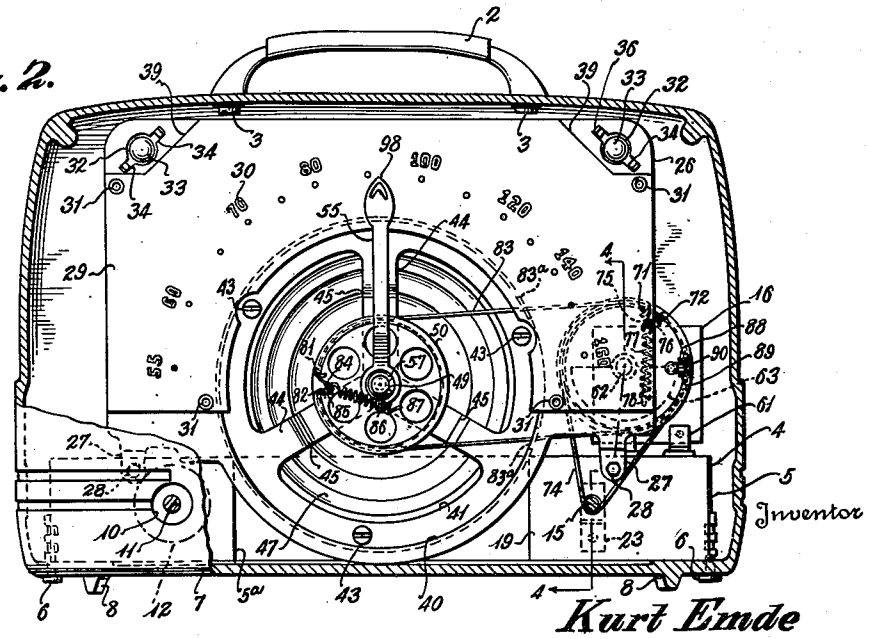

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Fig. 3.

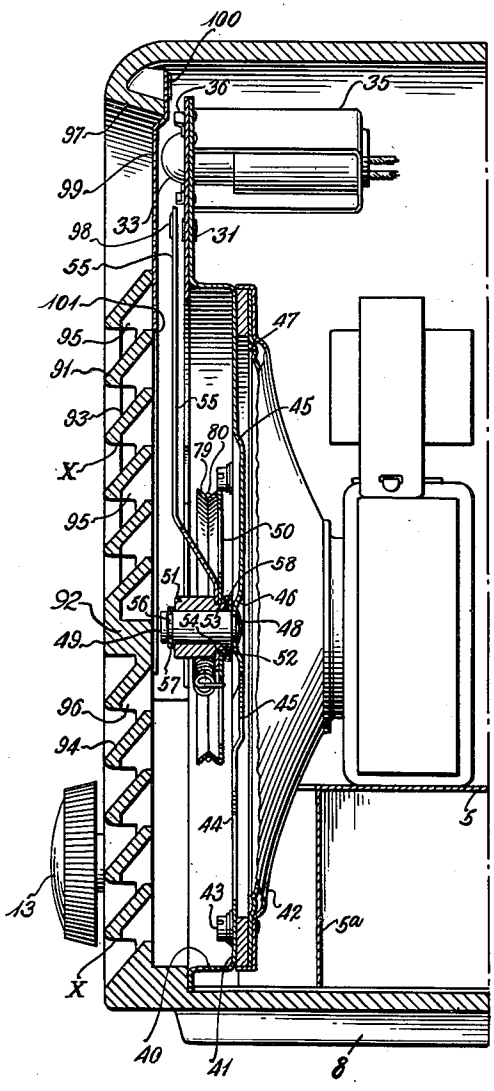



Fig. 5.

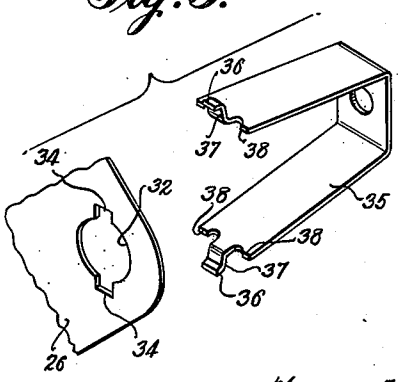
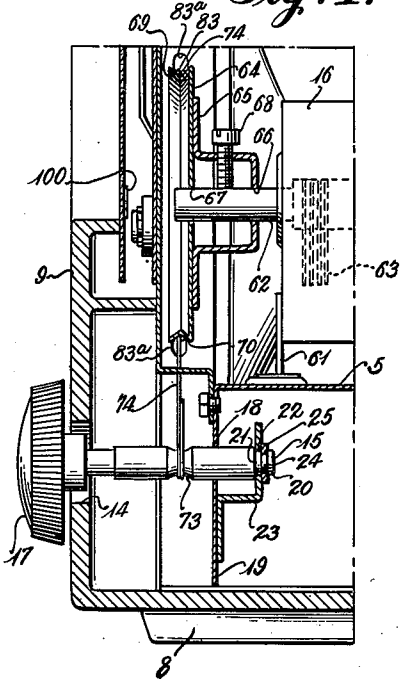



Fig. 4.

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2,272,937

# UNITED STATES PATENT OFFICE

2,272,937

## RADIO RECEIVING APPARATUS

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Application June 11, 1941, Serial No. 397,609

1 Claim. (Cl. 250—14)

This invention relates to radio receiving apparatus and more particularly to a radio receiving set including an arrangement of parts adapted to provide improved tone qualities and simplified easy tuning.

One of the principal objects of the invention is to provide a molded grill construction which will shield or conceal the parts behind it so that the need for the usual grill cloth, which is expensive and difficult to apply, is eliminated.

Another object of the invention is to provide a grill construction which will improve to some extent the acoustic properties of a radio receiving set.

Another object of the invention is to provide a receiving set having a novel grill construction so associated with a loud speaker, indicator needle and dial that the set as a whole may be made more compactly.

Another object of the invention is to provide a cabinet for a broadcast receiving unit, including a chassis carrying a loud speaker, arranged so that the unit may be bodily inserted into the cabinet.

A further object of the invention is to provide comparatively simple drive means for simultaneously actuating a tuning condenser and a dial indicator.

Still another object of the invention is to provide a pilot light mounting means which will enable quick and easy assembly of the pilot light relative to the dial.

One of the principal features of the invention is a novel grill construction including louvers arranged concentric with the axis or center of the diaphragm of the loud speaker and with a dial and needle indicator interposed between the grill and the loud speaker, the axis of rotation of the needle indicator also being substantially concentric with the axis of the loud speaker. The grill, obviously, may be formed integral with the cabinet as shown herein, or the grill may be mounted upon the cabinet, or formed and sold as a separate element for use with a loud speaker unit.

Another feature of the invention resides in a comparatively simple mounting means for a dial indicator needle, the mounting means including a plate preferably secured to the loud speaker and the chassis.

Other objects and features of the invention will be apparent from the following description taken in conjunction with the drawings in which:

Fig. 1 is a front elevation of a complete receiving set constructed in accordance with the principles of the present invention;

Fig. 2 is a view of the set with the major portion of the front of the cabinet broken away;

Fig. 3 is an enlarged fragmentary sectional view taken on the line 3—3 of Fig. 1 and particularly showing the shape of the grill louvers and the construction of the supporting means for the indicator needle;

Fig. 4 is an enlarged fragmentary sectional view taken on the line 4—4 of Fig. 2 and particularly showing the mounting means for the tuning shaft and the drive for the rotor shaft of the tuning condenser; and

Fig. 5 is a perspective view illustrating the details of the structure employed to enable quick and easy mounting of the pilot lights which serve as illuminating means for the dial.

Referring now to Figs. 1 and 2, the numeral 1 generally indicates a cabinet for the receiver which may be made of Bakelite, molded plastic, or any other suitable material. The cabinet 1 is provided with a handle 2 whereby it may be readily carried from place to place. The handle 2 is secured to the cabinet 1 by suitable screws 3 mounted from the interior of said cabinet (see Fig. 2).

The broadcast receiving unit is generally indicated by the numeral 14 and includes a chassis 5 held in place within the cabinet by suitable screws 6 extended through the bottom 7 of said cabinet. Pads 8 depend from the bottom 7 of the cabinet and serve to space the cabinet proper from the surface of a table or other supporting means.

The front wall 9 of the cabinet 1 is provided with a circular opening 10 through which the shaft 11 of a conventional on-and-off and volume control switch 12 extends (see Fig. 2). A knob 13 is frictionally secured to the shaft 11 to facilitate manipulation of the switch and control of the volume.

The front wall 9 is also provided with a circular opening 14 (Figs. 1 and 4) through which a main drive shaft 15 for actuating a tuning condenser 16 extends. A tuning knob 17 is frictionally mounted upon one end of the drive shaft 15. The shaft 15 extends through an opening 18 in a front portion 19 of the chassis 5. The end of the shaft 15 opposite that carrying the knob 17 is reduced in diameter as indicated at 20, thereby providing a shoulder at 21. The reduced end 20 is received in an opening 22 formed in a bracket 23 which is welded or otherwise secured to the inner surface of the chassis

portion 19. The reduced portion 20 is provided with a circumferential groove 24 for the reception of a conventional split retaining washer 25. Thus, it will be apparent that the shaft 15 is free to rotate relatively to the chassis portion 19 and the bracket 23 and is maintained in assembled relation with the bracket 23 by the shoulder 21 and the washer 25.

A vertical main plate 26 is provided with offset tabs 27 (Fig. 2) secured to the chassis 5 by screws 28. A dial 29 having suitable indicia 30 to aid in tuning the receiver is secured to the main plate 26 by a plurality of eyelets 31. The plate 26 is also provided at each of its upper corners with a circular opening 32 through which a pilot bulb 33 for illuminating the dial 29 extends. The opening 32 has diametrically opposed slots or notches 34 merging thereinto. The pilot bulb 33 is carried by a generally U-shaped mounting member 35 (see Figs. 3 and 5), said mounting member having laterally extending prongs 36 adapted to be received in the slots 34. The prongs 36 are angularly bent, as best shown at 37 in Fig. 5, and project beyond the extremities of the legs of said U-shaped member to provide shoulder portions 38. The mounting member 35 is preferably made of material having some springiness so that the sides of said member must be pressed toward each other to permit the prongs 36 to pass into the slots 34. Upon release of pressure upon the member 35, the prongs 36 automatically draw the shoulders 38 into tight engagement with the rear surface of the main plate 26 and thus provide a means for easily, quickly and securely mounting the pilot bulb 33 upon said main plate. As is clearly shown in Figs. 1 and 2, two pilot bulbs 33 are employed so that the dial 29 is amply illuminated. The upper corners of the dial 29 are removed or cut away, as indicated at 39 (Fig. 2) so as not to interfere with the insertion of the pilot bulb 33 and prongs 36 into the opening 32 and notches or slots 34.

The main plate 26, in addition to being secured to the chassis 5 through the off-set tabs 27 and screws 28, is provided with a circular depression or recess 40 defined in part by a flange 41 (Figs. 2 and 3), which is secured to a conventional loud speaker 42 by circumferentially spaced screws 43. The chassis 5 is set back or recessed at 5a (Figs. 2 and 3) to accommodate the lower portion of the loud speaker 42 and enable the parts to be more compactly arranged.

Three radial arms 44 extend inwardly from the flange 41 of the plate 26 and each arm is off-set, as indicated at 45. The arms 44 merge with each other at a central hub portion 46 which is concentric with the center or axis of the speaker cone or diaphragm 47.

The central hub portion 46, as is best shown in Fig. 3, is provided with an aperture 48 adapted to receive one end of a stud shaft 49, a portion of said stud shaft being riveted over the metal of the hub portion to permanently secured the two together. A sheet metal pulley 50 is rotatably mounted upon the stud shaft 49 and includes a solid hub portion 51, one end of which is reduced, as indicated at 52, to extend through a central opening 53 in the pulley 50 and an opening 54 in one end of an indicator needle 55. The reduced portion of the hub 51 is peened over the outer surface of the pulley 50 so that the hub 51, pulley 50 and indicator needle 55 are permanently assembled together in a desired predetermined relation. The stud shaft 49 is provided with a groove 56 adjacent its outer end for the reception of a conventional split washer 57. The washer 57 is adapted to retain the pulley 50 in assembled relation with the shaft 49. A felt washer 58 extends around the stud shaft 49 between the central boss portion 46 of the main plate 26 and the innermost portion of the hub 51 of the pulley 50. The felt washer 58 may be saturated with lubricant, if desired.

The tuning condenser 16 (Figs. 2 and 4) is mounted upon the chassis 5 by suitable fastening means 61. This condenser is of conventional construction and includes a rotor shaft 62 connected with rotor blades 63. A sheet metal pulley 64 has a bracket 65 secured to the rear side thereof by spot welding or otherwise. The bracket 65 is provided with an opening 66 to receive the rotor shaft 62 and the pulley 64 is provided with a similar opening 67. A set screw 68 threadedly mounted in the bracket 65 serves to secure the pulley 64 to the rotor shaft 62 in non-rotatable relation.

The pulley 64 (Fig. 4) is provided with a peripheral flange 69 having a generally V-shaped groove 70 formed therein. The flange 69 is severed or broken and turned back, as indicated at 71 and 72, respectively, in Fig. 2. The drive shaft 15 is provided with a concave groove 73 intermediate its ends, as is best shown in Fig. 4. This groove is adapted to in effect serve as a drive pulley of comparatively small diameter. A flexible cable 74 of textile or other suitable material has at least one turn thereof wrapped around the drive shaft 15 in the groove 73 so as to provide sufficient friction to substantially preclude relative sliding movement of said cable with respect to said shaft when the tuning knob 17 is rotated. The cable 74 has eyelets 75 and 76 secured to its opposite ends. The cable 74 snugly engages with the bottom of the V-shaped groove 70 of the pulley 64 and is arranged so that the end portion thereof having the eyelet 75 extends over the bent flange portion 71 and the end portion having the eyelet 76 extends over the bent flange portion 72. One end of a spring 77 extends through both eyelets 75 and 76 and the opposite end of said spring is hooked around a pressed-out tongue 78 projecting from the body of the pulley 64. It will be apparent from the foregoing, that the spring 76 is arranged so as to provide continuous tension in the cable 74. With portions of the cable 74 extending over the bent portions 71 and 72, a more or less fixed relation is established between the cable 74 and pulley 64 so that rotary movement of the drive shaft 15, by turning of the tuning knob 17, will necessarily result in proportionate rotation of said pulley 64 and the rotor shaft 62 of the tuning condenser, to effect the desired tuning of the set.

The pulley 50 associated with the indicator needle 55 has a peripheral flange 79 provided with a generally V-shaped groove 80. The flange 79 is broken and bent inwardly, as indicated at 81 and 82 (Fig. 2), to provide portions similar to the bent portions 71 and 72 of the pulley 64. A second cable 83, preferably of material similar to that employed in the cable 74, is provided with eyelets 84 and 85 in the opposite ends thereof, and these eyelets are connected to one end of a spring 86, the opposite end of said spring being anchored to the pulley 50 by having the end thereof extended into an opening 87. In order to establish a definite driving relation between the pulleys 64 and 50, the flange 69 of the pulley 64 is also broken and bent inwardly, as indicated

at 88 and 89. A pin 90 is fixed to the pulley 64 opposite the last-mentioned break in the flange 69. The cable 83 extends through the flange 69 and is wrapped around the pin 90 at least once so that the cable 83 is more or less fixedly secured in relation to the pulley 64. The cable 83 extends through openings 83a (Figs. 2 and 4) in the wall of the plate 26 defining the recess 40. Thus, it will be apparent that whenever the pulley 64 is rotated, corresponding rotation will be imparted to the pulley 50 to rotate the indicator needle 55 through substantially the same angle that the rotor 63 of the tuning condenser 16 has been turned.

The dial needle 55 is adapted to be rotated through a total angle of about 180° and it will be noted that the breaks in the flanges of the pulleys 50 and 64 are arranged so as to permit such movement without hindrance. Again, the dial 29 is of generous size and the portion 73 of the drive shaft 15 is small so that minute adjustment of the indicator needle 55 can be attained to simplify and facilitate the tuning operation.

The front wall portion 9 of the cabinet 1 is provided with a grill generally indicated by the numeral 91. The grill 91 comprises a horizontal diametrical web 92 and two series of arcuate or concentric louvers 93 and 94, one series being arranged above and the other below the horizontal web 92. The cross-sectional shape of the louvers 93 and 94 is best shown in Fig. 3, from which it will be noted that each of the louvers, in addition to being arcuate, extends on an angle of approximately 45° and terminates at its outer edge in a bead X. The louvers 93 are interconnected at their inner edge portions by vertically extending webs 95, and the louvers 94 are similarly interconnected by webs 96. The louvers 93 extend toward their axis exteriorly of the cabinet 1 and the louvers 94 extend toward their axis interiorly of said cabinet.

Although the louvers 93 and 94 are arranged concentrically, and may be said to be "dished" in opposite directions, the louvers 94 extend in the same angular direction as the louvers 93 so that the effect of the louvers 93 will be to direct the sound waves from the speaker downwardly and toward a line passing through the axis of the speaker cone 47, whereas the tendency of the louvers 94 is to deflect the sound waves and spread the same in a direction away from the axis of the cone. In this manner a better distribution of the sound waves emitted by the loud speaker 42 is accomplished by deflection thereof downwardly, resulting in a better acoustical reproduction of the program being received.

It will also be apparent from Fig. 3 that the louvers 93 and 94 are arranged so that when the set is in its normal position, the plate 26, loud speaker 42, pulley 50, etc., are hidden from view, thereby eliminating the use of the usual grill cloth for this purpose.

The front of the cabinet 1 is provided with a dial opening 97 defined in part by the outermost of the louvers 93. The dial opening 97 is arranged so that the indicia 30 on the dial 29 are visible therethrough. The indicator needle 55 terminates in a more or less arrowhead-like end 98 that extends beyond the outermost louver 93 and cooperates with the indicia 30 to indicate the wave length to which the receiving set is tuned. A sheet of transparent material 99, such as Celluloid, extends across the dial opening 97 in front of the indicator needle 55 and is detachably secured in place by means of conventional push-type friction fastening elements 100. The transparent sheet 99 is cut away behind the louvers 93, as indicated at 101 (Fig. 1), so as not to obstruct the passage of the speaker sound waves through the upper set of louvers 93.

From the foregoing description, it will be apparent that the receiver set may be placed into operation by turning the switch and volume control knob 13. It will also be apparent that the set may be tuned to the desired station by turning the tuning knob 17. Rotation of the knob 17, of course, turns the drive shaft 15, which drives the pulley 64 through the cable 74. The pulley 64 in turn drives the pulley 50 through the cable 83, so that the indicator needle 55 traverses the dial 29. The set may be placed out of operation by turning the switch and volume control knob 13 back to its original position, in the manner well understood. The dial or pilot lights 33 are positioned out of alignment with the dial opening 97 (Fig. 1) but furnish sufficient light to completely illuminate the dial and are preferably arranged in the circuit so that they are turned on whenever the knob 13 turns the switch 12 on.

It will be understood that various modifications and changes may be made in the structure herein disclosed without departing from the spirit of the invention or the scope of the appended claim.

I claim:

A grill for use in front of a radio loud speaker, comprising: a plurality of concentric louvers, a web extending diametrically of said louvers so that a series of louvers is arranged upon opposite sides of said web, the louvers of each of said series being arranged upon an angle relative to their axis, the louvers of one series extending angularly toward said axis on one side of the grill and the louvers of said other series extending angularly toward said axis on the opposite side of said grill.

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