

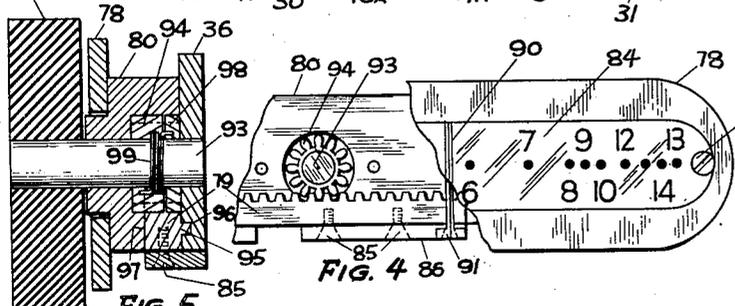
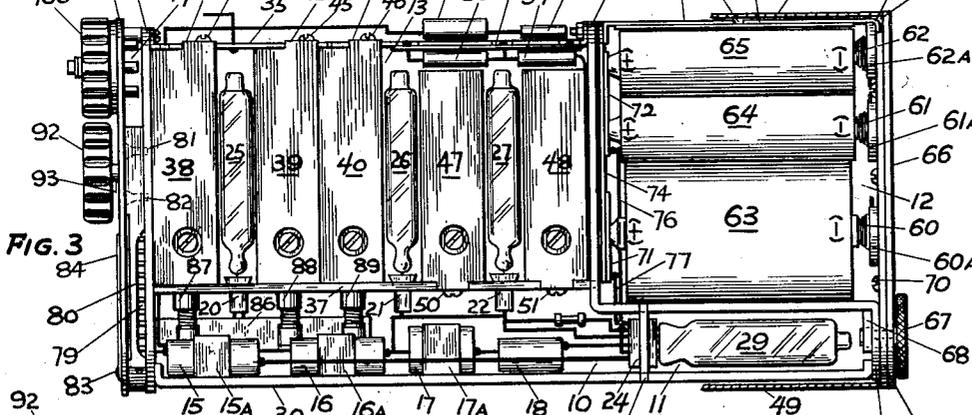
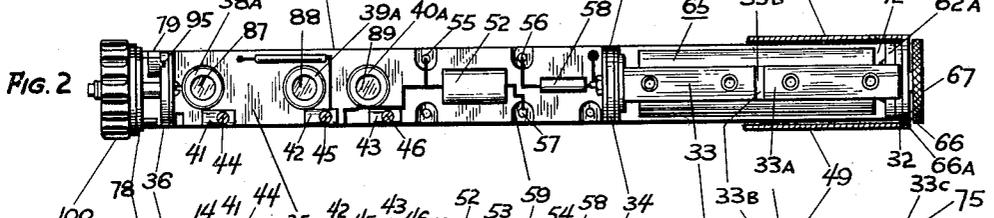
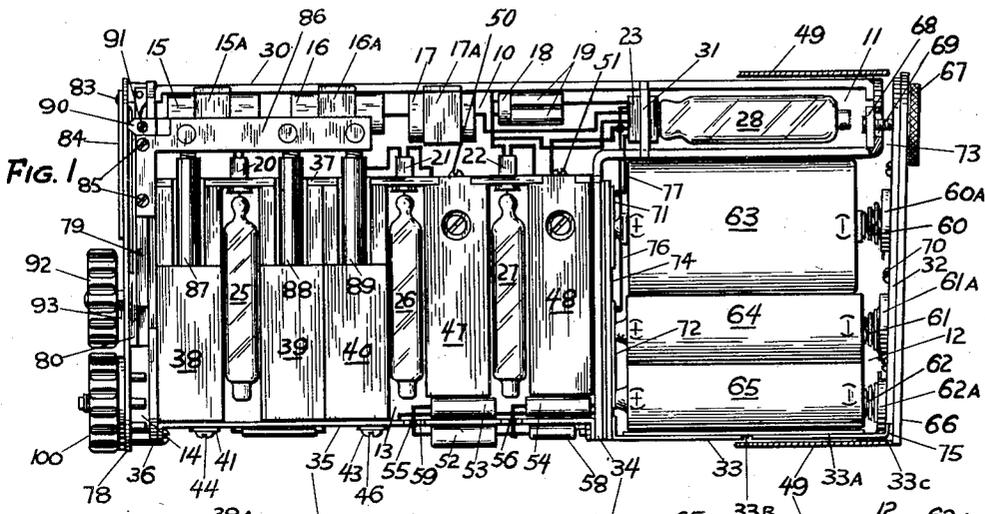
Feb. 7, 1950

L. M. TEMPLE
RADIO TUNING DEVICE

2,496,424

Filed July 10, 1946

2 Sheets-Sheet 1



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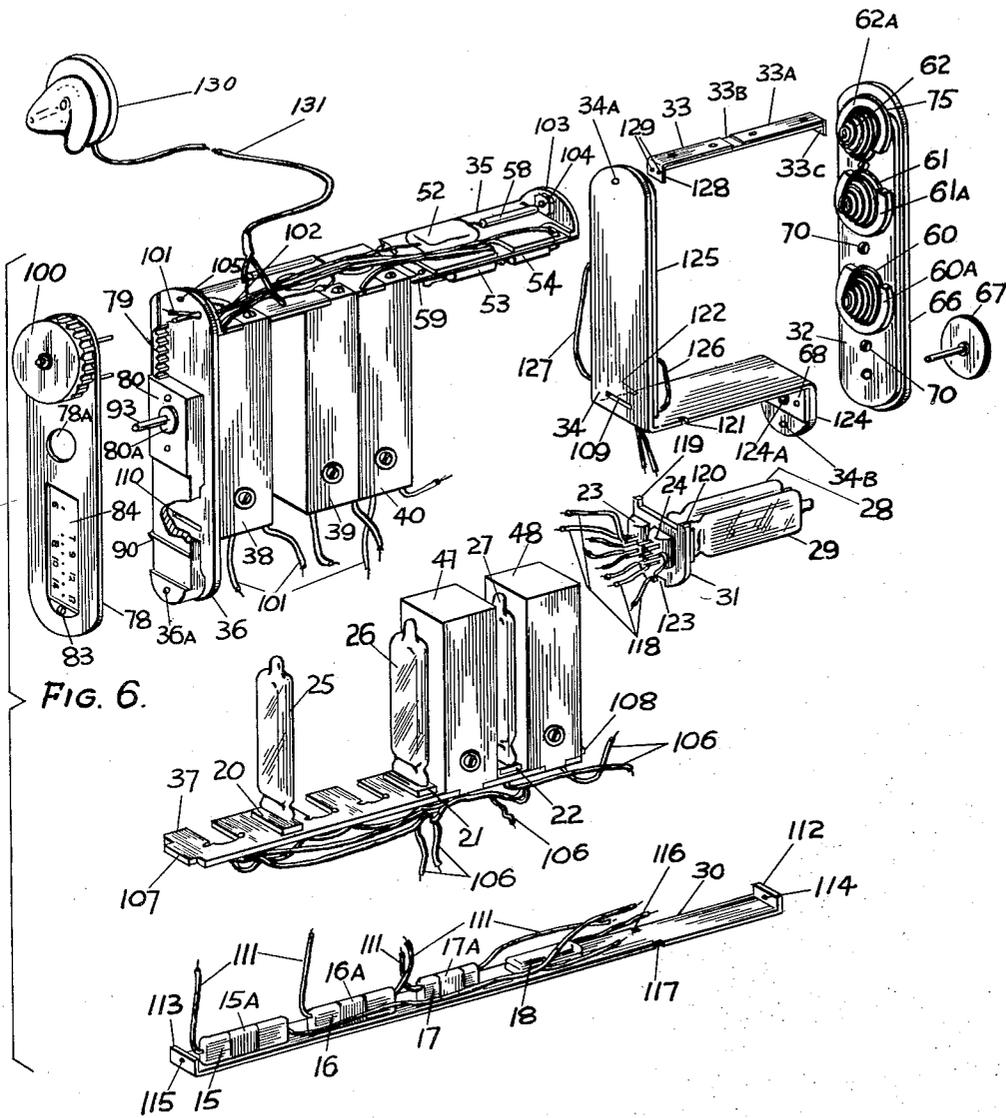
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RADIO TUNING DEVICE

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This invention relates to radio receivers of the sub-miniature type, and more particularly to the construction of such devices.

It is a main object of the present invention to provide a device of the type described having such dimensions that same can be conveniently carried on the person of the user thereof.

Another object of the present invention is to provide a device of the type described which shall be encompassed within a framework of substantially shallow proportions suitable for insertion in the vest-pocket of a user thereof.

For a more complete comprehension of the above and other objects of the present invention, reference is had to the following description and attached drawings, in which:

Fig. 1 is a plan view of the device of the present invention;

Fig. 2 represents a view of one edge of the device of the present invention to illustrate, substantially, the shallow construction thereof;

Fig. 3 depicts a plan view of the opposite side of Fig. 1;

Fig. 4 presents an end view of the device illustrating the controls and frequency indicating means;

Fig. 5 is a cross-sectional view of the tuning drive; and

Fig. 6 presents an exploded view of the device.

Referring to Figs. 1, 2, and 3, the device of the present invention comprises a plurality of shallow compartments 10, 11, 12, 13, and 14. When speaking of compartments in connection with the description of the device of this invention, the term encompasses metal frame members 30, 31, 32, 33, 34, 35, 36, 37 and cover 49 (cover shown in partial cross-section). All of said compartments are combined into a shallow substantially rectangular assembly.

Compartment 10 encompasses a plurality of capacitors 15, 16, 17, 18, and a pair of resistors 19, three of said capacitors being fastened to frame member 30, for example, by riveting the supporting bands 15A, 16A, and 17A thereto. Extending into compartment 10 are a plurality of miniature vacuum tube sockets 20, 21, 22, 23, and one socket 24 which is positioned behind socket 23 in Fig. 1. Sockets 20, 21, and 22 are supported by frame member 37, and sockets 23 and 24 by frame member 31. The aforementioned sockets support a plurality of subminiature electron-discharge devices or vacuum tubes 25, 26, 27, 28, and 29, tube 29 being positioned behind tube 28 in Fig. 1.

Aforesaid vacuum tubes 25, 26, and 27 are

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placed within compartment 13, together with shielded permeability-tuned stages 38, 39, and 40, said last-named stages being firmly affixed to frame member 35 by fastening extended portions 41, 42, and 43 of said shielded stages to said frame member 35 with screws 44, 45, and 46 as shown in Figs. 2 and 3. Also placed within said compartment 13 are shielded intermediate frequency stages 47 and 48, said stages being fastened to frame member 37 by screws 50 and 51.

Capacitors 52, 53, and 54 are soldered to terminal points 55, 56, and 57, as indicated more clearly in Fig. 2, resistor 58 being soldered to terminal point 56. The foregoing terminal points are carried by insulating member 59 which itself is fastened to frame member 35.

Within compartment 12 and held in good electrical contact by spring members 60, 61, and 62, are dry cells 63, 64, and 65. Cell 63 is the high potential source while cells 64 and 65 furnish the necessary current for the filaments of electron-discharge tubes 25, 26, 27, 28, and 29. Spring members 60, 61, and 62 are held in position by supporting members 60A, 61A, and 62A, said last-named supporting members being rigidly affixed to frame member 32.

A novel switching arrangement for said dry cells is provided by frame member 32. Said member 32 is attached to a second metal member 66 by screws 70, said member 66 having a slightly larger area than said member 32. A knurled and threaded member 67 is threadedly engaged with an insulating member 68 through aperture 69 in member 34 and through apertures (not shown) in members 32 and 66. Rotating member 67 in the proper direction causes member 32 to separate from frame member 34 at point 73 and by this means to open the circuit which conducts the potentials supplied by dry cells 63, 64, and 65, said frame members being the ground point for the radio components of the present device. Fig. 3 shows the position of frame member 34 in intimate contact with member 32 and in this position the potential-carrying circuit is closed or completed and current supplied to the components of the device.

Attention is called to frame member 33 which is made up of three parts, 33, 33A, and 33B. Members 33 and 33A are made of metal, spaced apart and riveted to insulating member 33B. The purpose of this particular construction is to avoid conducting current from dry cells 63, 64 and 65 through this part of the structure as its function is to support said dry cells within compartment 12 and member 33A particularly func-

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tions to maintain members 32 and 66 in position at point 75. The bent portion 33C of member 33A laps over member 62A and acts as a fulcrum at point 75 for members 32 and 66.

Metal contacts 71 and 72 are attached, by riveting, for example, to insulation member 74, and current from the plus side of the aforementioned dry cells is conveyed via conductors 76 and 77 to the various components requiring said current.

Member 66 is made slightly larger, in this particular embodiment, than member 32, said members being held together by screws 70. This particular arrangement maintains cover 49 in position when it is slipped over the entire assembly as the combination of 32 and 66 form a shoulder 66A against which the cover 49 abuts. If it is necessary to remove said cover to repair or replace any of the components, member 67 is unscrewed from its position entirely and combined members 32 and 66 lifted from the assembly.

Fig. 2 illustrates an edgewise view of the structure and shows in plan view frame members 33, 33A, 33B, and 35 and end views of frame members 32, 66, 34, and 36. It also shows inductors 38A, 39A, and 40A, said inductors being fitted into apertures in said frame 35. These last-named inductors are enclosed in shielded stages 38, 39, and 40.

Volume control knob 100 is a combination of a hollow knob with a variable resistance (not shown) therein and is attached to member 36.

Placed between frame members 36 and 78 is a tuning drive which comprises, as illustrated in Figs. 1, 2, and 3, rack 79, and rack support 80. Said rack support is fastened to member 36, for example, by screws 81, 82, and 83; screw 83 also holds in place, on member 78, a transparent dial 84. Fastened to rack 79, for example by screws 85, is a flat L-shaped member 86, said L-shaped member having fastened to the longer arm thereof a plurality of permeability tuning cores 87, 88, and 89. Attached to said L-shaped member at the junction of the arms of same is a dial pointer 90, said pointer being fastened to said L-shaped member, for example, by screw 91.

Fig. 4 is an open view of the tuning drive and illustrates in greater detail the arrangement of rack 79 and the driving pinion gear 94 which imparts to said rack a linear motion. Said linear motion is also imparted to member 86 which supports the powdered iron tuning cores 87, 88 and 89 as described above in connection with Figs. 1, 2, and 3. Pinion gear 94 is tightly fitted to shaft member 93 as by sweating same onto said shaft or by other suitable means. A dial 84, having inscribed thereon designations for locating desired broadcast programs, is fastened over an opening in member 78 by screw 83.

Fig. 5 illustrates in cross-section the manner in which rack 79 is held in position between members 36 and 78. Member 36 has along its entire length a slot 95 into which is fitted a raised ridge 96, said ridge being integral with rack 79 and continuous along the entire length thereof. The opposite side 97 of said rack is in slidable contact with member 80, said member 80 being held in this position by screws 81 and 82 as illustrated in Fig. 3. Adjacent driving pinion gear 94 is a spring-loaded pinion gear 98 having the same number of teeth and pitch, but not as thick as gear 94, said gear 98 being loosely fitted to shaft 93. Disposed between said gears is helical spring member 99, said spring being fastened at one end to gear 94 in a recess therein, the other end being bent perpendicular to its length and placed in an

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aperture in gear 98. Gear 98 is rotated so that spring 99 becomes tightly wound and the teeth of rack 79 are meshed with the teeth of both gears 94 and 98. This causes the teeth of gears 94 and 98 to exert pressure in opposite directions within the working depth of the teeth of rack 79 and thus eliminates play or backlash between said rack and pinion. Tuning knob 92 is attached to shaft 93 by suitable means such as a set screw or the like.

Despite the diminutive size of the device of the present invention, the novel construction of the frame members and the means for combining them provide a structure which can be readily and rapidly assembled. It would appear at first glance that a radio receiver constructed along lines described and illustrated would present a most difficult wiring problem. Such is not the case. Every frame member serves to support some of the various components that go into the construction of the present device and it will be shown by Fig. 6, an exploded view of the device, that the novel arrangement and configuration provide means for rapid wiring and assembling of said device.

Referring now to Fig. 6, frame member 35 has affixed to it permeability tuned stages 38, 39, and 40, said stages being fastened to said frame member 35 in the manner hereinbefore described. Also supported by said member are a plurality of capacitors 52, 53, and 54 and resistors 58 on either side together with a terminal strip 59 to which said capacitors and resistors are fastened. The wiring of components for this particular frame member is completed and sufficient lengths of wire 101 are provided to connect these last-named stages to other components. Both ends 102 and 103 are turned up perpendicular to the main part of member 35, said ends having apertures 104 and 105 provided therein for the passage of fastening means therethrough. Also attached to said member 35 is earphone 130, the leads 131 from said earphone serving as an antenna and conductor for the audio frequency output of the device.

Now frame member 37 is prepared and it carries sockets 20, 21, 22, and intermediate stages 47 and 48. All the wiring that can be completed for this structure is done and as before sufficient lengths of wire 106 are left unterminated for connection to other stages or components. The ends 107 and 108 of member 37 are slightly narrower in width than the main body of said member to form tongues which fit into apertures 109 and 110 provided for them in members 34 and 36, respectively.

Frame member 30 supports a plurality of capacitors and resistors, a portion of the capacitors 15, 16, and 17 being supported by metal bands 15A, 16A, and 17A surrounding same, said bands being riveted, for example, to frame member 30. All the aforesaid components are wired as explained hereinbefore and enough extra wire 111 left for connections to other parts of the device. Ends 112 and 113 are bent perpendicular to the main member 30 and have apertures 114 and 115 provided therein for fastening to frame members 34 and 36. Notches 116 and 117 are provided to hold in position frame member 31.

Frame member 31 supports two sub-miniature tube sockets 23 and 24, which in turn support two sub-miniature radio tubes 28 and 29. The sockets have wires 118 connected thereto and as in the other frame members sufficient wire is left to provide for other connections. Frame mem-

ber 31 is formed with two extended portions 119 and 120 to fit two notches 121 and 122 in frame member 34. The edge opposite the extended portions 119 and 120 has a notch 123, which fits across the material in the space between notches 116 and 117 with a snug fit. When all the frame members are fastened together, frame member 31 will be held firmly between frame members 30 and 34.

Frame member 34 is a substantially L-shaped member, the base thereof having a portion 124 bent perpendicular thereto and in a direction away from the leg of said frame member 34, said last-named leg having fastened thereto an insulating member 125 for supporting thereon contact plates 71 and 72 (not shown in Fig. 6 but illustrated in Fig. 1). Lead wires 126 and 127 are fastened to said contact plates and provide the means for conducting current to the radio tubes. Attached to inside of the junction at bent portion 124 is an insulating member 68 having affixed therein a tapped metal member for receiving threaded member 67, the insulating member 68 serving to electrically insulate member 67 from frame member 34 when said members are separated as explained hereinbefore.

Members 33, 33A, and 33B form an integral member, 33 and 33A being formed of metal and 33B of an electrically insulating material such as Bakelite or the like. Both members 33 and 33A have one end bent perpendicular to the main portion thereof. End 128 has apertures 129 provided therein for fastening said member 33 to member 125. End 33C serves as a fulcrum, when placed in space 75 between members 62A and 66, for members 32 and 66 when same are caused to move out of contact with member 34 by manipulation of threaded member 67 (as illustrated in Fig. 1). Spring members 60, 61, and 62 provide the urge necessary to separate members 32 and 66 from frame member 34. Said springs are held in position on member 32 by innerly grooved, partially circular members 60A, 61A and 62A, said springs providing a strong point of contact with the negative side, for example, of dry cells 63, 64 and 65 (not shown in Fig. 6 but illustrated in Figs. 1, 2, and 3).

The combination of members 34, combined members 33, 33A and 33B, and combined members 32 and 66, form a compartment for the aforementioned dry cells.

Frame member 36 serves to support the tuning drive mechanism which includes rack 77, rack-supporting member 80, driving pinion shaft 93 and other portions of said drive (not shown in Fig. 6). Member 80 is fastened to member 36 as hereinbefore described and thus holds in place the various components making up the tuning drive.

Member 78 supports the combined volume control and knob 100 and transparent dial 94. It is provided with an aperture 78A which fits over boss 80A, and shaft member 93 extends through said aperture 78A when member 78 is fastened to member 36 through apertures 36A and 105. After member 78 is fastened in place to member 36, tuning knob 92 (see Figs. 1, 2 and 3) is fastened to shaft 93.

After all the preliminary wiring of the various components, as hereinbefore described, has been done, member 37 is fitted to member 36 by insertion of tongue 107 into aperture 110. Then member 34 is placed in position so that tongue 108 fits within aperture 109, member 34 being fastened to member 35 by means of screws, or the like, inserted through apertures 104 and 34A. Member

31 is now wired in position by connecting wires 118. After all the necessary wiring connections are made, end 113 of frame member 30 is fitted to member 36 and fastened thereto by means of screw 83 inserted through aperture 36A and threaded aperture 115. Member 31 is now placed in notches 116 and 117 of member 30 and the extended portions 119 and 120 placed in notches 121 and 122 of member 34. With these last-named components in position, end portion 112 is fastened to portion 124 of member 34 by means of screws (not shown), or the like, inserted through aperture 34B and threaded aperture 114. Member 33 is fastened by screws (not shown) to member 125.

These aforementioned operations point out the ease with which the device may be assembled; although the steps indicated are the preferred ones, the assembly may be carried out in any manner desired. All fastening is accomplished by the use of screws or bolts which are preferred, although it is also possible to use other means for holding the various compartments together and still retain the feature of ease in assembling and dismantling the device of the present invention as by means of interlocking or the like.

Members 32 and 66 are fastened together by screws 70 and are the only members not semi-permanently fastened. This arrangement permits the user of the device to replace the dry cells when necessary and requires only that member 67 be completely unscrewed from threaded member 124A.

The device as described provides a novel construction, the overall depth of said structure being governed by the thickest component therein. Although this particular embodiment describes the use of the device in connection with a miniature radio receiver, it is also adaptable to hearing aids, electronic stethoscope amplifiers, and other devices requiring a thin flat structure according to the device of this invention.

Having described the device of the present invention, it should be understood that many modifications will occur to those skilled in the art but such modifications do not represent a departure from the true spirit and scope of the present invention.

What is claimed is:

1. In combination, a radio receiver having a substantially rectangular metal supporting frame therefor, said frame being divided into contiguous compartments for supporting therein the components of said receiver, and all of said components lying in a single common plane transverse to the thinnest dimension of said frame to form a shallow assembly, the depth of said assembly being substantially equal to the thickness of the thickest one of said components.

2. In combination, a radio receiver having a substantially rectangular metal supporting frame therefor, major components of said receiver being supported between the longer parallel members of said frame, tuning means for said receiver, said means being supported by one of the shorter members of said frame, and all of said components lying in a single common plane transverse to the thinnest dimension of said frame to form a shallow assembly, the thickness of said assembly being substantially equal to the thickness of the thickest one of said components.

3. In combination, a radio receiver having a substantially rectangular metal supporting frame therefor, major components of said receiver being supported between the longer parallel mem-

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bers of said frame, all of said components lying in a single common plane transverse to the depth dimension of said frame to form a shallow assembly, the thickness of said assembly being substantially equal to the thickness of the thickest one of said components, and a dust-proof cover completely enclosing said frame and said components.

4. In combination, a radio receiver having a permeability tuning device comprising at least one inductance and a movable iron core slidably mounted within said inductance, a rack attached to said core and extending parallel thereto, rotatable means threadedly engaged with said rack for imparting linear motion to said rack and core, a rectangular metal frame for supporting said tuning device, rack and rotatable means within the confines thereof, a dust-proof cover completely enclosing said frame and the tuning device components therein, and means located exteriorly of said cover for manually actuating said rotatable means.

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