

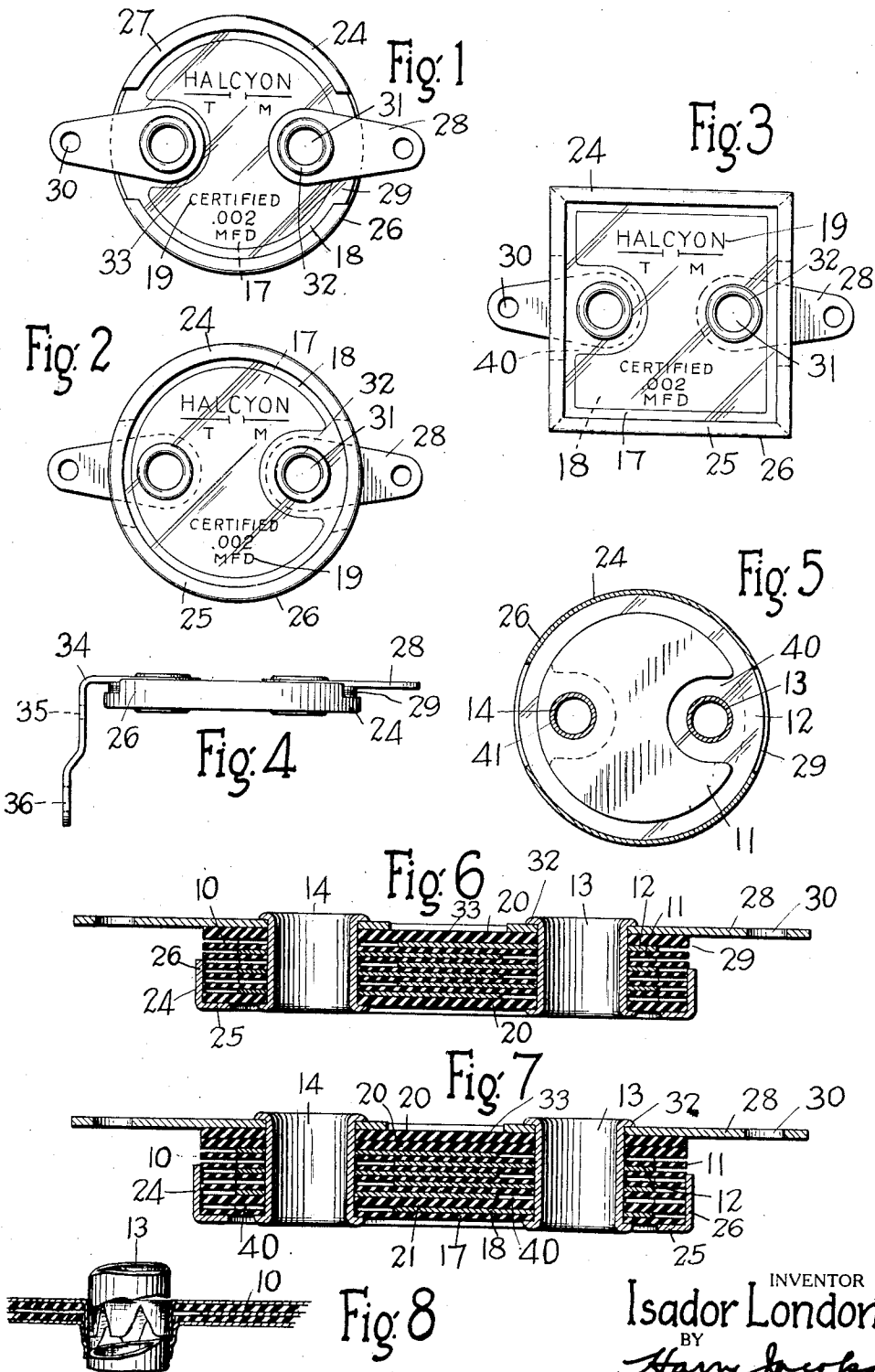
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ELECTRICAL CONDENSER

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ELECTRICAL CONDENSER

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This invention relates to electrical condensers of fixed capacity and particularly to that type designed for use in radio and similar apparatus.

5 It is well known that one of the requirements of a fixed condenser of the type to which this invention pertains is that the condensers have a definite capacity which must not vary under the different conditions of
10 practical use, arising from weather and temperature conditions, rough handling, and buckling of the parts when heated as when connections are soldered thereto. The mechanical construction of the condenser, therefore, is important so that the requirement
15 mentioned may be met. Condensers made heretofore have been more or less imperfect by reason of the difficulty in maintaining the parts thereof in sufficiently fixed special relation, and by reason of the fact that more
20 or less air can reach the interior of the condenser stack. If the parts of the condenser are not held firmly together by unyielding means, they tend to separate slightly under
25 the conditions above mentioned, thereby allowing air to enter between the parts and since air is a dielectric, and frequently carries moisture in varying degrees, the capacity of the condenser will, therefore, vary. Various
30 attempts have been made to bind opposite edges of the condenser permanently in place by means of clips and the like, so that the external air may be permanently excluded, but said attempts have been more or
35 less unsuccessful by reason of the defective mechanical construction of the condensers heretofore used in that the peripheral edges of the condenser have not heretofore been substantially completely enclosed in a unitary
40 securing rim such as that which is an important feature of the present invention.

My invention contemplates the provision of a condenser structure in which the parts are permanently fixed together in such relation that the capacity is sufficiently fixed and
45 unvaried even for the accurate requirements of radio work. The various objects of my invention will be clear from the description which follows, and from the drawings, in
50 which,

Fig. 1 is a bottom plan view of my improved condenser, showing among other things, one form of my improved tab secured thereto.

Fig. 2 is a top plan view of the same.

Fig. 3 is a similar view of a modified form of my condenser.

Fig. 4 is a front elevation of my improved condenser showing a modified form of attaching tab or clip.

Fig. 5 is a horizontal section of that form of my invention shown in Figs. 1, 2 and 4.

Fig. 6 is a vertical section of one form of my improved condenser.

Fig. 7 is a similar view of a modification, and

Fig. 8 is a similar view of a portion of the condenser stack showing how the intimate contact between alternate conducting sheets is attained.

For reasons of economy of manufacture, ease in assembly of the individual condenser parts into a complete unit and of the assembly of the complete condenser in a radio set, and in order further to eliminate the sharp
75 outstanding or projecting corners which are well known to be always disadvantageous in radio apparatus I prefer to make the condenser proper circular in outline, as illustrated in Figs. 1, 2 and 5, though it will be
80 understood that substantially all of the structural features of my invention may be applied with substantially equal advantages to condensers of the square type illustrated in Fig. 3 or to those of other shapes as may suit
85 the fancy of the user.

The condenser stack 10 is of the usual type which need not here be described in great detail. It may merely be said that the stack 10 comprises a series of plates as 11 and 12
90 alternately arranged and of dielectric material such as mica, and conducting material, such as copper respectively, every other one of the conducting plates 12 being suitably connected with only one terminal as 13 of
95 the condenser, while the other alternate set of conducting plates 12 are similarly connected only to another terminal as 14 in a manner well known in the art. I prefer to use eyelets as 13 and 14 not only for hold-
100

ing the stack together, but also for acting as terminals in the usual manner.

The conducting sheets 12 are suitably cut away as at 40 to make certain that no contact can be made between said sheets and one of the terminals. At a point 41 opposite the cut away part 40, a hole considerably smaller in diameter than the diameter of the body of the eyelet may be made, or the sheet may be left imperforate at said point 41, if desired. The sheets are assembled with the cut away part 40 of alternate conducting sheets 12 in substantially vertical alignment, it being understood that a dielectric sheet 11, suitably perforated to allow the eyelets to pass therethrough separates each sheet 12 from the succeeding conducting sheet. It will, therefore, be seen that every fourth sheet presents an obstacle to the passage of the eyelet through the stack. When the eyelet terminal is inserted in the stack, and pressed therethrough, perforations are made by the eyelet, or if previously made, are enlarged by the eyelet at the ends 41 of the conducting sheets 12 to a size equal to that of the eyelet, and the perforated material is forced alongside the outer surface of the eyelet into contact with that of the alternate conducting sheets and into intimate electrical contact with the eyelet. (Fig. 8.) The eyelets serve also for the purpose of securing soldering tabs as 15 and 16 for electrical connections to the condenser. At the top and bottom of the condenser stack 10, I prefer to place sheets as 17 of dielectric and preferably transparent material such as mica or the like, instead of the heavy and stiff material such as fiber or bakelite heretofore used for this purpose. That conducting sheet 18 immediately below the outer sheet 17 is suitably stamped or otherwise impressed with lettering as 19 indicating the capacity of the condensers or giving any other information which it may be desired to convey.

It will, therefore, be seen that the matter 19 printed on the uppermost and lowermost of the conducting sheets is visible from the outside of the condenser and that said matter, being protected by the outermost dielectric sheets from the corrosive action of the atmosphere and from wear due to handling and the like, will be visible with the same clarity throughout the entire life of the condenser.

I attain the requisite stiffness in the condenser in two ways. First, I insert in the stack a dielectric sheet as 20, somewhat greater in thickness than others of the dielectric sheets. In that type of stack shown in Fig. 6 the sheets 20 comprise the uppermost and lowermost sheets of the condenser stack, while in that shown in Fig. 7, a sheet as 21 thicker than the other interior dielectric sheets may be inserted between conducting sheets at a point intermediate of the outermost sheets. The sheet 21 is illustrated in

such a position that it is the second of the dielectric sheets from the bottom, though I do not wish to be limited to the specific position thereof shown.

The thickness of the stiffening sheets 20 and 21 is not such, however, as would make them comparatively inflexible. I have found a certain amount of flexibility is a distinct advantage in bringing the condenser to a given capacity. It being understood that the stack is assembled under pressure which flattens the sheets and squeezes out the air therebetween, and that said stack is then secured by the eyelets, the condenser may be tested after assembly, and if the capacity is not correct, sufficient pressure may be put on the stack to bring the capacity to the predetermined figure. If the stiffening sheets 20 and 21 are stiff, flat and comparatively inflexible, pressure on the condenser can have no such effect.

The second means for stiffening the condenser is by the use of an enclosing rim as 24 preferably of a single piece of material and preferably channel shaped in cross-section. Said rim preferably comprises a flange 25 pressed into contact with the entire outer portion of the face of one of the outside sheets, a preferably upright web as 26 in close contact with the upright edge of the stack, and a second flange as 27 bent into contact with the peripheral portion of the face of the other outside sheet of the stack, said rim 24 serving to exclude external air from the interior of any part of the stack.

It will be understood that while the flange 27 is illustrated as cut away at 29 to allow the terminal tabs 28 to be secured in place without danger of short circuit, if it is desired to dispense with said tabs, the flange 27 may be made identical in extent with the flange 25, whereby the upright edge and part of the faces of the condenser are completely enclosed. It will further be understood that in constructing my improved condenser the stack is first formed, then compressed, and the eyelets and tabs secured thereto, the eyelets maintaining the pressure and the capacity of the stack, and finally the rim 24 pressed about the edges of said stack and clamped into place.

The tabs as 28 are made of conducting material such as metal and each have a hole as 30 wherein a connecting wire may be readily soldered, said hole being substantially of the diameter and the cross-sectional shape of said wire, and a second hole as 31 to allow the passage of the eyelet therethrough. The tab is preferably secured by one of the flanged heads 32 of said eyelet to the face 33 of the stack, and may take any one of a number of forms, such as that illustrated in Figs. 1, 2 and 3, or that illustrated at 34, (Fig. 4). In the latter form, the tab 34 is secured by the eyelet in position through a

suitable hole and may be bent into any suitable form. A soldering hole 35 is provided in the tab 34, while a second hole 36 much larger in diameter is provided for securing the condenser in place at any part of a set with convenience and ease. While Fig. 4 illustrates one tab 28 at one terminal and a tab 34 at the other terminal, it will be understood that similar tabs are preferably used at both terminals for convenience. Since the tab is preferably made of thin sheet metal, and is exposed for substantially its entire length, it will be seen that heat applied to the tab, as when a wire is soldered thereto, is largely dissipated before it reaches the eyelets and that, therefore, a minimum amount of the heat is transmitted to the condenser. It will also be seen that the tab may be forcibly rotated about the eyelet to a convenient soldering position for the reason that it is secured pivotally to the face of the condenser out of contact with the enclosing rim thereof and independent of the rim of the condenser.

To insure that no short circuit can occur between the rim 24 and the tabs 28 or 34, one of the flanges 27 adjacent to said tabs is completely cut away and part of the web 26 is similarly cut away for a suitable space about said tabs, though the size of said space is such as not to detract from the efficacy of the clamping action of the rim 24.

It will be seen that there is considerable economy in the manufacture of round condensers as against condensers of other form in that dies of considerably less cost are required, that there is considerably less time and labor in the assembly of the device, and that less material is used with equal or better electrical effect. It will further be seen that by the provision of tabs the condenser may be conveniently mounted in place and connections soldered thereto without heating the condenser, with the resultant deleterious effect.

In addition it will be seen that by the use of transparent dielectric sheets at the top and bottom of the stack the lettering on the condenser sheets is unchangingly displayed, and finally it will be seen that by my improved construction I have provided a condenser which is firm and compact, and so assembled and constructed as to be readily brought accurately to a predetermined capacity and caused to maintain said capacity without material variation.

The structure referred to herein is intended to be merely illustrative of my invention, and I, therefore, do not wish to be limited to the specific construction shown, as it will be obvious that various changes such as in the proportions and arrangement of the parts and in the mode of assembly may be made without departing from the spirit and scope of this invention.

I claim:

1. In an electrical condenser, a stack comprising a multiplicity of flat alternate sheets of conducting and insulating material arranged in layers, a unitary rim secured substantially completely about in close contact with, and substantially enclosing the edges of all of said sheets, and the peripheral portions only of the outermost sheets of said stack, a pair of eyelet terminals each passing through all of the sheets in said stack, and in contact with one set of alternate conducting sheets, and flanged rims on said eyelets in direct contact with and pressing the outermost sheets of said stack toward each other with the remaining sheets pressed therebetween.

2. In a fixed electrical condenser, a stack comprising a series of flat sheets of conducting and insulating material alternately arranged in layers, unitary means substantially completely enclosing the outer edges of said stack for excluding external air therefrom and for stiffening said stack, and an eyelet terminal forced through the material of alternate conducting sheets and holding said sheets together, the material in the path of said eyelet being bent into pressed intimate mechanical and electrical contact with said eyelet.

3. In a fixed electrical condenser, a stack comprising a series of flat sheets of conducting and insulating material alternately arranged, the outermost of said conducting sheets being adapted to have indicia impressed therein, a transparent insulating sheet covering said outermost conducting sheet, for permanently maintaining said indicia in visible position and for protecting said indicia, an eyelet terminal forced through the stack and bending the material of alternate conducting sheets in its path into intimate contact therewith, and flanged rims on said eyelet pressing on the outer faces of the outermost insulating sheets.

4. In a fixed electrical condenser, a condenser stack including thin conducting sheets and insulating sheets separating said conducting sheets, and having readable indicia on the outermost of said conducting sheets, a transparent insulating sheet covering said outermost conducting sheet, an eyelet terminal forced through, in intimate contact with, and spreading that part of the material of alternate conducting sheets in its path, a soldering tab, and flanged rims on said eyelet securing said tab in place on said stack and pressing the sheets of said stack together for protecting said indicia.

5. In a fixed electrical condenser, a stack including conducting sheets and insulating sheets separating said conducting sheets, a unitary rim substantially completely enclosing the edges of said sheets, a soldering tab of conducting material, independent and extending beyond said stack having an opening

therein in spaced relation to said condenser of the size and shape of the wire to be secured therein, and means in electrical contact with alternate conducting sheets for securing said tab against the outermost sheet of said stack and for pressing said sheets together.

6. In a fixed electrical condenser, a stack including conducting sheets and insulating sheets separating said conducting sheets, a rim engaging and substantially enclosing the edges of all of said sheets and engaging the peripheral part of the outer faces of the outermost sheets, and means independent of said rim connected electrically to alternate conducting sheets holding said sheets together under pressure.

7. In a fixed electrical condenser, a stack including conducting sheets and insulating sheets separating said conducting sheets, an eyelet passing through said stack, perforating alternate conducting sheets and acting as a terminal therefor, a soldering tab having a hole therein in spaced relation to said condenser adapted to have a wire soldered therein, flanged rims on said eyelet securing said tab to the outer face of said stack and pressing all of said sheets together for maintaining the capacity of said condenser fixed, and a unitary peripheral rim engaging and substantially completely enclosing the edges of said sheets and engaging only the peripheral portion of the faces of the outermost sheets of the stack for excluding external air from the interior of said stack and for stiffening said stack.

8. In a fixed electrical condenser, a stack including circular conducting and insulating sheets arranged alternately, said insulating sheets each having a pair of diametrically opposed apertures thereon in alignment with the apertures in the remaining sheets, and said conducting sheets being partly cut away, a circular rim covering the edges of said sheets and bent into contact with the outer faces of the outermost sheets of said stack, an eyelet passing through one set of the apertures in said insulating sheet and through the cut away part of one set of alternate conducting sheets and passing through and perforating the other set of alternate conducting sheets, the material in the path of said eyelet remaining unsevered from said sheet and disposed about and in intimate contact with the cylindrical surface of said eyelet, a second similar eyelet diametrically opposite said first mentioned eyelet and similarly arranged in the stack, and flanged heads on said eyelets maintaining the fixed capacity of the condenser under pressure.

9. In a fixed electrical condenser, a stack including insulating sheets, conducting sheets between said insulating sheets, means for substantially enclosing the edges of all of said sheets and the peripheral portions and the outer faces of said condenser comprising an

enclosing rim of sheet metal and inwardly turned flanges on said rim pressed against said portions and means exerting pressure on said stack for maintaining the fixed capacity of said stack.

10. In an electrical condenser, a cylindrical stack comprising metal plates and plates of dielectric material alternately arranged, an enclosing rim for said stack of a single piece of sheet material U-shaped in cross section, comprising a member of the height of said stack partly covering the peripheral edges of said stack and having gaps therein, and a pair of flanges each integral with said rim and bent into firm contact respectively with the upper and lower faces of said stack for pressing on the plates of said stack to keep the plates under an even distribution of pressure to maintain a constant capacity.

11. In an electrical condenser having a stack of alternate conducting and insulating sheets, a soldering tab of a piece of conducting sheet material separate and distinct from said condenser and having a pair of spaced openings therein near the respective ends thereof, one of said openings being in spaced relation to said condenser and adapted to have a wire of substantially the same size as said opening soldered thereto, and the other of said openings being adapted to allow said tab to be secured directly to the outermost insulating sheet forming the face of said condenser.

12. In an electrical condenser, a stack, means for holding said stack together under pressure and serving as the terminals of the condenser, and a tab independent of said condenser and formed of a comparatively short piece of sheet material pivotally secured in place and in pressed direct contact with the sheet of the stack forming the outer face of said condenser by the insertion of said holding means therethrough, part of said tab projecting over the edge of said condenser whereby a wire may be soldered to the end thereof and a minimum amount of the heat applied to the tab by soldering is conducted to said holding means.

13. In an electrical condenser, a stack comprising alternate sheets of conducting and insulating material and an eyelet terminal in contact with alternate sheets of conducting material, said eyelet being forced through and perforating said alternate sheets, perforated material on said sheets being bent around the outer surface of the eyelet for causing intimate contact between said sheets and said eyelet, and flanged rims on said eyelets in direct contact with and pressing the outermost sheets of said stack toward each other with the remaining sheets pressed therebetween.

14. In a fixed electrical condenser, a stack comprising a series of flat sheets of conduct-

ing and insulating material alternately arranged, a rim independent of the condenser terminals having gaps therein substantially covering the cylindrical edge of said stack and having its edges bent into pressed contact with the peripheral outer surface of the outer members of said stack and exerting pressure on said stack, and means comprising a pair of eyelets independent of said rim and spaced therefrom and each having at least one flanged head exerting pressure directly on the outermost sheet of said stack for maintaining the capacity thereof.

15. In a fixed electrical condenser, a stack of alternately arranged sheets of conducting and insulating material, a rim having gaps therein substantially covering the edge of said stack and having the edges thereof bent into pressed contact with the periphery of the outer surfaces of said stack, eyelets spaced from said rim and passing through and exerting pressure on said stack for maintaining the capacity thereof constant and comparatively short soldering tabs pivotally secured to the face of said stack by said eyelets and passing beyond said rim at the gaps thereof.

16. In a fixed electrical condenser, a stack of alternately arranged sheets of conducting and insulating material, a pair of eyelets passing through said stack and each in contact with alternating sheets of conducting material and flanged rims on said eyelets in direct contact with and pressing the outermost sheets of said stack toward each other with the remaining sheets pressed therebetween for maintaining constant the capacity of said condenser.

17. In a fixed cylindrical condenser, a stack comprising alternate sheets of conducting and insulating material, headed means passing through said stack for engaging and exerting pressure directly on the outermost sheets of said stack for maintaining the capacity of said condenser constant, and a tab secured to the face of said condenser on the outermost sheet of the stack by said headed means, said tab being formed of a comparatively short thin piece of sheet metal adapted to have a wire soldered thereto.

18. In a fixed electrical condenser, a stack, means passing through said stack for holding said stack together, an enclosing peripheral rim for said stack having gaps therein substantially enclosing the edges and the peripheral portion of said stack, and a soldering tab formed of a comparatively short piece of thin sheet metal adapted to have a wire soldered thereto secured to the face of said condenser by said holding means and extending past the gaps in said rim whereby electrical contact between said tabs and said rim is prevented.

19. In an electrical condenser, a cylindrical stack comprising alternate sheets of conducting and insulating material, the outermost of

said conducting sheets having reading matter stamped therein, a protective transparent sheet comprising the outermost dielectric sheet covering the stamped conducting sheet, the reading matter on said conducting sheet being permanently visible through said outermost sheet, and a pair of eyelets passing through said stack and flanged over and thereby exerting pressure directly on the protective transparent sheet for securing all of the sheets together.

20. In an electrical condenser, a stack comprising alternate sheets of conducting and insulating material, a soldering tab independent of said stack having an opening therein in spaced relation to said condenser, of the size and shape of the cross-section of the wire to be secured thereto, and lying directly upon the outermost insulating sheet, an eyelet forced through the stack and thereby diverting the material of alternate conducting sheets in its path into intimate pressed contact with the outer surface thereof, a second similar eyelet forced through the other alternate conducting sheets, said eyelets passing through and permanently holding said stack and said tab together, and a flange on each of said eyelets in pressed contact with the face of said tab and exerting pressure on said tab and said stack while allowing the tab to be forcibly rotated thereunder on the surface of the outermost insulating sheet.

21. A condenser comprising a cylindrical shell with an open end and gaps in its side walls, metal plates and plates of dielectric material alternately placed in said shell, the shell having rolled edges to cause said edges to press on the plates in the shell to keep the plates under an even distribution of pressure to maintain a constant capacity.

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