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MOLDED HEAT EXTRACTOR CONNECTION

Filed May 21, 1930

Fig. 1.

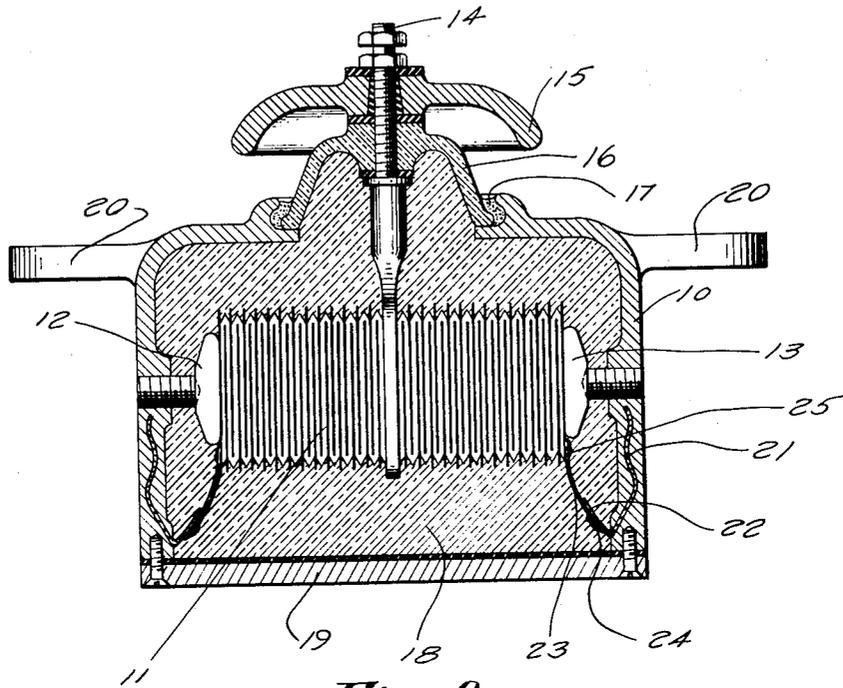
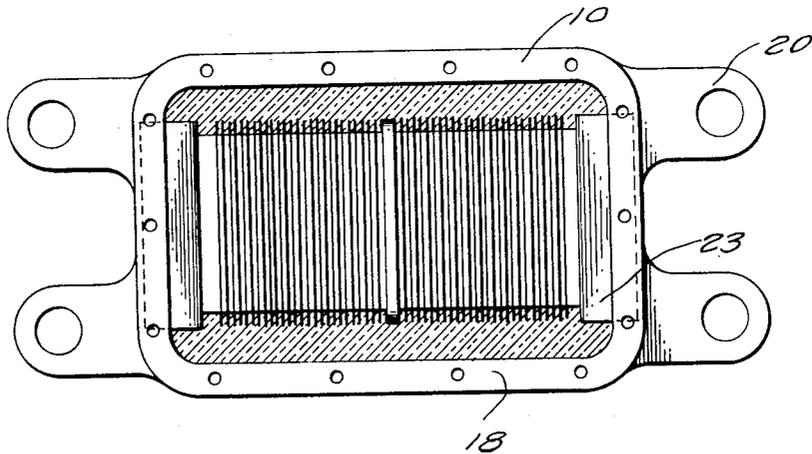


Fig. 2.



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TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

MOLDED HEAT EXTRACTOR CONNECTION

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This invention relates to condensers which are adapted to carry substantial current values and has for its object to lessen the temperature increase of the condenser with a given value of current, by increasing the electrical and thermal conductivity between the stack and an outer metal wall.

When aluminum is used as the material of the casing or clamping abutment and as a heat dissipator exteriorly exposed to atmosphere, in addition to being an electrical conductor it has been discovered that the resistance and temperature increase of the device under load can be lowered by the provision of some suitable means for avoiding reliance for conductivity on the thin oxide film which seems to form on an aluminum surface without being noticeable to the eye.

According to this invention an improved connection is made to an aluminum heat-dissipating wall by casting a copper strip into the wall and having an end portion of the strip projecting flexibly therefrom for connection to the stack.

Referring to the drawing Fig. 1 is a longitudinal section, through one embodiment to this invention.

Fig. 2 is a bottom plan view of the device shown in Fig. 1 with the bottom plate removed and some of the wax broken away to reveal the stack.

This invention is illustrated as applied to a well known type of high-frequency (radio) condenser having the casing 10 preferably of aluminum in which is placed the mica foil stack 11 clamped between the adjustable end clamping plates 12 and 13 and provided with a high potential terminal 14 leading to a midpoint of stack 11. As is customary a corona shield 15 is provided around the high potential lead and where such terminal 14 extends thru the casing it is provided with a bushing shaped as illustrated which comprises a pyrex or boro-silicate glass inverted bowl 16, secured to the casing by cement 17 as shown. Terminal 14 extends thru the smaller of the two opposite casing-openings. This condenser body 11 is passed into the hollow, box-like casing by way of the larger and bottom opening. Within the casing is

the usual readily fusible wax embedment 18 cast in place around body 11 in the casing by pouring when molten through the open bottom in the inverted condition of the casing, Fig. 2; and after the embedment 18 has cooled and solidified a bottom plate 19, Fig. 1, is secured in position. The casing is provided with the customary supporting lugs 20.

In order to provide a connection of higher thermal and electrical conductivity between the stack or body ends and the casing on opposite sides, a wide, thick flexible copper strip 21 is cast in place inside the wall of the aluminum casing, with an end portion 22 of the strip projecting flexibly from the casing wall near the bottom casing opening below the body-clamp 13. Condenser body 11 in entering the casing, passes by flexible projecting strip-portion 23, and is clamped in place between 13—13. A thick, wide flexible copper lead 23 then is soldered at 24 to the projecting end 22 of strip 21 and soldered to the portion of the armature foils which project in a bunch from the condenser stack or body. The thermal and electrical connection of this nature is the same on the opposite sides of the casing and ends of the stack. Preferably the conductive strips 21 and 23 are each of sufficient size so that their electrical and thermal conductivity is more than the electrical and thermal conductivity of the foils in the stack. It has been found that notwithstanding the high melting point of the aluminum of the casing 10, the integrity of the flexible portion 22 projecting from the casing wall after the casting of the wall about the other end 21 of the strip, is preserved without injury to the continuity with the aluminum casing wall, of the flexible projecting portion 22 of the strip, so that in effect said portion 22 becomes an integral portion of the casing wall affording perfect thermal and electrical connection between the strip and the casing, so that all the heat developed inside the condenser body and conducted outside of it by the projecting foil-bunch is conducted to the casing by the thick wide flexible strips 23, 24, and spread

thru the casing walls where it is dissipated into the atmosphere.

Among the advantages of this invention may be mentioned the lower temperature increase with a given load and wave length than was heretofore possible. The soldered connections provide durable and highly conductive connections. From Fig. 2 it will be seen that the thick conducting strips 23 are of substantial width in order to obtain substantial thermal conductivity. The nature of the wide, thick copper strips 22, 23 is such that their free ends can be united thermally and electrically at 24; and the other end of strip 23 can be united similarly to the condenser foil-bunch without injury to the foils. The flexibility of the strips 23, 24 permits their manipulation for such uniting by desired heat treatment. Furthermore, the nature of strip 22 is such that one portion of its length can be cast and therefore embedded in the casing wall without affecting its non-embedded portion or the joint between said embedded and non-embedded length-
 25 portions. As shown in Fig. 1, a very substantial portion of strip 21 is embedded in casing-wall 10, but that is not necessary because the effect of embedding even a shorter portion of strip 21 in the casing-wall is to incorporate a portion of the strip as an integral portion of the wall so that full thermal conductivity is established with the wall for the entire cross-sectional area of the strip, so that in effect the projecting portion 22 of the strip is a projecting portion of the aluminum casing itself save for the desirable condition that projecting portion 22 is flexible for convenience of manipulation during heat treatment in uniting it with similar strip 23. This construction provides as effective a path of thermal and electrical conductivity between the condenser body and the heat-dissipating metal casing as would be provided by a theoretic casting of the condenser foil-bunch in the casing-wall which is apparently impossible for various obvious reasons. In order to make sure that the finished product has the desired thermal conductivity, a heat run may be made with a thermometer placed adjacent the lower soldered joint 24 so as to see if the temperature increase under given load measures up to the expected results, i. e. have been lessened to the desired extent. As is shown, as to the wide embedded strip 21 in the wall 10, both are in a plane parallel to the plane of the foils in condenser-body 11, so that the width of wide strips 22, 23 extending from wall 10 extends generally parallel to the wide end of the foil-bunch projecting from the lower side of the end of condenser-body 11, and consequently the wide end of strip 23 can be moved up alongside the wide end of the foil-bunch so that the widths of both lie alongside, after body 11 has been clamped in place between the two opposite casing-

walls, into position for soldering said wide ends together face to face to provide the good thermal connection between body 11 and strip 23.

What I claim is:

1. A condenser structure including a condenser body having wide armature foils projecting from it in a bunch as a thermal and electrical terminal of the body; a hollow box-like metallic casing inside of which said condenser body is located, said casing having its exterior surface exposed to atmosphere as a heat-dissipating surface of large area, the wall of the casing lying in a plane paralleling the width of said wide foil-bunch; and a wide, thick, flexible metallic strip having a portion of one end embedded in said wall of the casing, the width of said embedded portion of the strip extending parallel with said wall, and the other portion of the length of the embedded strip extending flexibly into the interior of the casing wherein the width of said free end of the strip extends alongside the width of said foil-bunch projecting from the condenser body.

2. A hollow box-like metallic enclosing casing, terminal and external heat-dissipator for an electrostatic condenser, and a wide, thick but flexible metallic strip for connecting said heat-dissipating casing to the enclosed condenser, said casing having comparatively thin walls, and formed with a large opening for entrance of the condenser body; said strip having a portion of one end embedded in a wall of the metallic casing, the width of said embedded portion of the strip extending parallel with the casing wall in which it is embedded, and the other portion of the embedded strip extending flexibly into the interior of the casing from a portion of said wall near said opening in the casing.

3. A condenser structure including a condenser body having wide armature foils projecting from it in a bunch as a thermal and electrical terminal of the body; a second terminal from the condenser-body of substantially greater length than the first; a hollow box-like metallic casing inside of which said condenser body is located, said casing having its exterior surface exposed to atmosphere as a heat-dissipating surface of large area; said casing being formed with two opposite openings respectively large and small; said second body-terminal projecting out thru said small casing-opening, and the other opening being sufficiently large for passage of the condenser body into the interior of the casing; and said first body-terminal lying inside the casing; one wall of the casing extending parallel with the width of said foil-bunch body-terminal; and a wide, thick, flexible metallic strip having a portion of one wide end embedded in said wall of the casing, the width of said embedded portion

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of the strip extending parallel with said wall, and the other portion of the length of the embedded strip extending flexibly from a portion of said wall near said large opening
5 in the casing to the interior of the casing wherein the width of said free end of the strip extends parallel to the width of said foil-bunch projecting from the condenser body.

10 4. A condenser structure including a condenser body having armature foils projecting from it in a bunch as a thermal and electrical terminal of the body; a hollow box-like metallic casing inside which said con-
15 denser body is disposed, said casing having its exterior surface exposed to atmosphere as a heat-dissipating surface of large area, said body terminal lying within said casing; and
20 a metallic lead substantially thicker than the individual armature foils of the terminal bunch but flexible, one portion of the length of said lead being embedded in the metal of
25 said casing and the rest of its length extending from said wall into the interior of the casing and flexible toward the armature foils.

5 5. A condenser structure including a condenser body having armature foils projecting from it in two foil-bunches as thermal
30 and electrical terminals of the electrical ends of the body at the same potential; a hollow box-like metallic casing inside which said condenser body is disposed, said casing hav-
35 ing its exterior surface exposed to atmosphere as a heat-dissipating surface of large area, said body-terminals lying inside the casing; said casing being formed with respectively
40 large and small openings in opposite walls; a mid-point terminal lead extending from the enclosed condenser body out of the casing
45 thru said small opening; the large casing-opening being sufficiently large for passage of the condenser body into the interior of the casing; and two wide metallic strips thicker
50 than the individual armature foils of the condenser body, portions of the ends of said strips being embedded in opposite walls of the metallic casing, and the other ends of said strips projecting from said walls along lines
55 near said larger casing-opening and extending flexibly into the interior of the casing wherein they are movable toward said foil-terminals of the condenser body.

In testimony whereof I hereunto affix my
55 signature.

WILLIAM M. BAILEY.

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