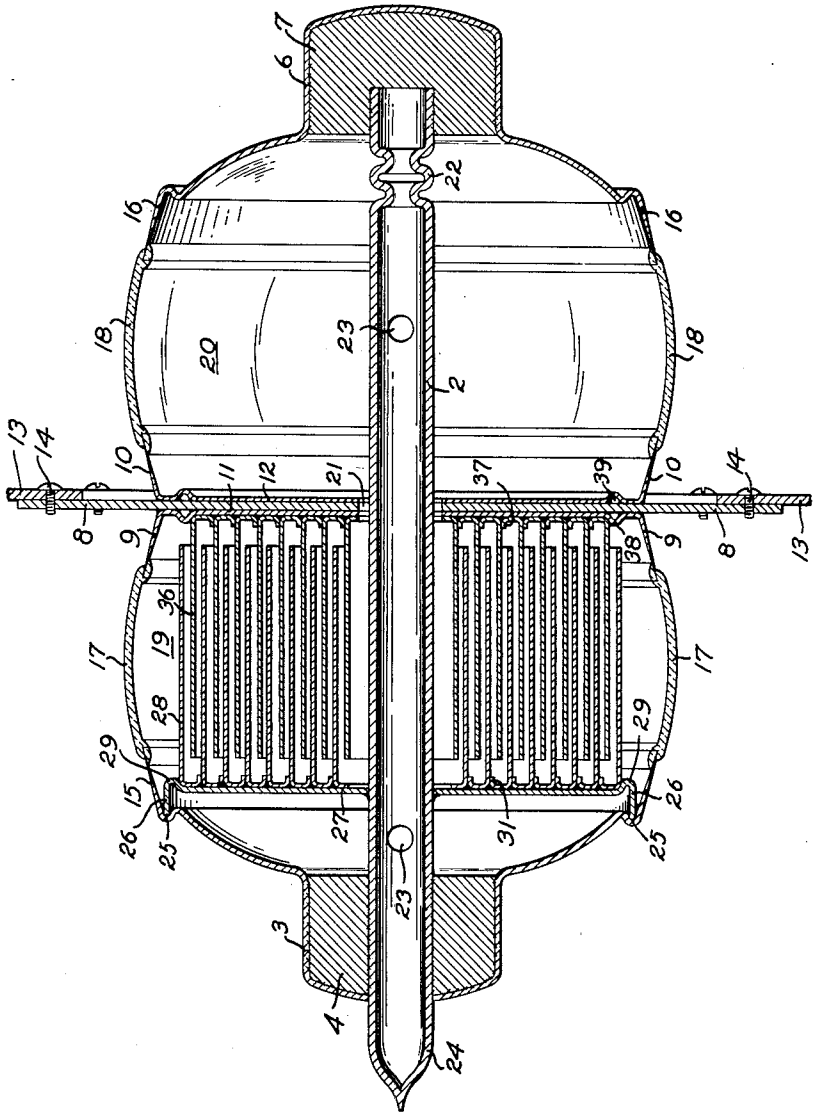
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FEED THROUGH CONDENSER

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FEED THROUGH CONDENSER

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My invention relates to vacuum condensers; and among the objects of the invention is the provision of a feed through condenser of improved and simplified mechanical construction, including the mounting means by which space is saved and efficiency in operation increased.

My invention possesses other objects, some of which will be brought out in the following description of the invention. I do not limit myself to the showing made by the said description and the drawings, since I may adopt variant forms of the invention within the scope of the appended claims.

Referring to the drawings, the figure is a sectional view taken in a plane coincident with the long axis of the condenser. The scale is approximately the full size of one of my larger units, although some of the thin parts such as condenser plates are shown out of true scale for clarity.

In terms of broad inclusion, the structure of my feed through condenser comprises a vacuumized envelope made in two sections which are arranged end-to-end upon a metallic junction ring which constitutes a shield between the two sections, and also a mounting flange by which the entire structure may be mounted in a suitable panel. The free end of each section is formed with a metal cap or terminal, separated from the junction ring by an insulating glass shell forming a major part of the envelope. The terminals are connected mechanically and electrically by a metallic rod extending centrally through both sections of the envelope, and which carries energy from one terminal to the other, so that both terminals are of the same potential.

Within the envelope in one of the sections, a series of condenser plates is mounted on the inside of the terminal cap; and a companion series of plates is mounted on the junction ring. A varying amount of expansion between connector rod and envelope walls is compensated by providing a bellows-like section in the rod. For strength and improved electrical values, the rod is preferably hollow; and this permits its use in exhausting the entire envelope.

The purpose of my unit is to carry electrical energy from one metallic or shielded section to another while at the same time providing a radio frequency by-pass to ground or shield, whichever the central junction ring is connected to. In general my unit is used in radio-frequency applications, such as Pi networks for antenna harmonic suppression circuits. It is capable of carrying large values of radio frequency current at high voltage.

The construction of my unit permits its mounting on the central junction ring, without the need for mounting feed-through insulators. This saves space, increases efficiency of operation and simplifies both electrical and mechanical construction, while providing a compact and strong structure.

In detail my condenser comprises a generally cylindrical, vacuumized envelope made up of two permanently connected sections arranged concentrically about

a central copper tube 2. A terminal cap 3, is secured to the tube near one end by means of the copper bushing 4, the parts being integrally united by being brazed together; and a similar cap 6 and bushing 7 is brazed over the other end of the tube. The two sections are mounted end-to-end on a centrally placed radially extending junction ring 8, provided with oppositely extending circular flanges 9 and 10. Preferably the flanges are bent up from thin flat plates 11 and 12 respectively, one of which is brazed on each side of the ring 8. This unit of brazed copper parts 8—12 can of course be made of one piece of copper, but however made it constitutes a shield to prevent electrostatic or magnetic coupling between the circuit components. The radially extending ring 8 also functions as a mounting flange for the entire condenser unit. The ring is securely fixed to a grounded metal panel 13, by a multiplicity of screws 14 to insure tight contact.

The terminal caps 3 and 6 are also formed with circular flanges 15 and 16 respectively extending toward and approximately of the same diameter as the junction ring flanges 9 and 10 respectively.

Between and sealed to flanges 9 and 15 is a glass shell 17. A similar shell 18 lies between and is sealed to flanges 10 and 16 to complete the two-section envelope, having the two chambers 19 and 20 connected together by the short annular passage 21 between the ring 8 and the tube 2.

Before the envelope is assembled, the end of the connector tube 2 which will be near the terminal 6, is shaped to form an expansion joint 22. This conveniently takes the shape of a metal bellows and provides the necessary elasticity of connection between the terminals of the envelope with its different rate of expansion. Near opposite ends of the tube but within the envelope, the tube is provided with holes 23, so that the external end 24 of the tube, before it is sealed off, may be used to exhaust the entire envelope.

When the terminal 3 with its flange 15 is being made, an annular groove 25 is formed inside at the base of the flange. This provides an accurate seat in which the circular rim flange 26 of the base plate 27 is brazed. The base plate is also brazed to the tube 2 where the tube passes through it; and also provides a mounting on which the cylindrical shells or condenser plates 28 are brazed.

The groove mounting of the flanged base plate insures its concentricity about the connector tube; and this concentricity is secured for the cylindrical shells 28 by a rim bead 29 within which the shells are assembled. Each shell except the inner one, is formed with an internal radial and return flange 31, snugly seated against the next smaller shell. The shells 28, base plate 27, terminal cap 3, bushing 4 and connector tube 2 are assembled and held in a suitable jig and brazed. This may be done at one time by use of induction heating so that a sturdy structure of high accuracy results. If desired, certain parts, such as the condenser plates and base plate, may be assembled and brazed into units, and then the units assembled and brazed.

The cylindrical shells 36, constituting the companion condenser plates, are similarly shaped with radial and return flanges 37, and brazed on the plate 11 within the concentric bead 38.

The flanged centrally apertured plates 11 and 12 are identical, being formed in the same die. Each is provided with the concentric bead 38 which on the opposite side of the plate forms the annular groove 39. When the plates are to be brazed to the junction ring or shield 8, silver solder previously placed in the grooves spreads between the plates under heat and insures integral union. The bead 38 on plate 11 provides means for the accurate centering of condenser plates 36 which are brazed thereon.

After the several units of assembled and brazed parts have been put together with the glass shells 17 and 18, the external end 24 of the tube is connected to the exhaust line, and when vacuumization of the envelope has reached the desired degree, the tube is sealed and pinched off by the application of jaws under high pressure.

The most important use of my feed through condenser is in harmonic or interference suppression circuits. This may be in antenna transmission lines or in 60 cycle high amperage power circuits. My condenser will handle currents up to several hundred amperes, depending upon the dimensions of the copper tube and the diameter and thickness of the seals, although of course, the design is calculated according to the requirements of the circuits in which it is to be used.

I claim:

1. A feed through condenser comprising a first and a second generally cylindrical section disposed end-to-end about a central long axis to form a vacuumized envelope, the free end of each section constituting a metallic terminal and having a concentric flange extending toward the other terminal, the adjacent ends of the sections being a metallic junction ring having a concentric flange on each side extending toward the adjacent terminal flange, a concentric glass shell arranged between the mutually reaching flanges of each section and hermetically sealed therewith, a set of condenser plates mounted in the first section on the terminal flange thereof, a set of companion condenser plates mounted in the first section on the junction ring, and a metallic rod within the envelope and electrically connecting the end terminals.

2. A feed through condenser comprising a first and a second generally cylindrical section disposed end-to-end about a central long axis to form a vacuumized envelope, the free end of each section constituting a metallic terminal and having a concentric flange extending toward the other terminal, the adjacent ends of the sections being a metallic junction ring having a concentric flange on each side extending toward the adjacent terminal flange, a concentric glass shell arranged between the mutually reaching flanges of each section and hermetically sealed therewith, a set of condenser plates mounted in the first section on the terminal flange thereof, a set of companion condenser plates mounted in the first section on the junction ring, and a metallic rod within the envelope and electrically connecting the end terminals, said junction ring constituting an electrostatic shield.

3. A feed through condenser comprising a first and a second generally cylindrical section disposed end-to-end about a central long axis to form a vacuumized envelope, the free end of each section constituting a metallic terminal and having a concentric flange extending toward the other terminal, the adjacent ends of the sections being a metallic junction ring having a concentric flange on each side extending toward the adjacent terminal flange, a concentric glass shell arranged between the mutually reaching flanges of each section and hermetically sealed therewith, a set of condenser plates mounted in the first section on the terminal flange thereof, a set of companion condenser plates mounted in the first section on the junction ring, a metallic rod within the envelope and electrically connecting the end terminals, said junction ring constituting an electrostatic shield and a mounting flange for the condenser.

4. A feed through condenser comprising a first and a second generally cylindrical section disposed end-to-end about a central long axis to form a vacuumized envelope, the free end of each section constituting a metallic terminal and having a concentric flange extending toward the other terminal, the adjacent ends of the sections being a metallic junction ring having a concentric flange on each side extending toward the adjacent terminal flange, a concentric glass shell arranged between the mutually reaching flanges of each section and hermetically sealed therewith, a set of condenser plates mounted in the first section on the terminal flange thereof, a set of companion condenser plates mounted in the first section on the junction ring, and a metallic rod within the envelope and electrically connecting the end terminals, said rod having a thermal expansion portion therein.

5. A feed through condenser comprising a first and a second generally cylindrical section disposed end-to-end about a central long axis to form a vacuumized envelope, the free end of each section constituting a metallic terminal and having a concentric flange extending toward the other terminal, the adjacent ends of the sections being a metallic junction ring having a concentric flange on each side extending toward the adjacent terminal flange, a concentric glass shell arranged between the mutually reaching flanges of each section and hermetically sealed therewith, a set of condenser plates mounted in the first section on the terminal flange thereof, a set of companion condenser plates mounted in the first section on the junction ring, and a metallic tube axially disposed concentrically within the envelope and electrically connecting the end terminals.

6. A feed through condenser comprising a first and a second generally cylindrical section disposed end-to-end about a central long axis to form a vacuumized envelope, the free end of each section constituting a metallic terminal and having a concentric flange extending toward the other terminal, the adjacent ends of the sections being a metallic junction ring having a concentric flange on each side extending toward the adjacent terminal flange, a concentric glass shell arranged between the mutually reaching flanges of each section and hermetically sealed therewith, a set of condenser plates mounted in the first section on the terminal flange thereof, a set of companion condenser plates mounted in the first section on the junction ring, and a metallic tube within the envelope and fixedly connected to the end terminals.

7. A feed through condenser comprising a first and a second generally cylindrical section disposed end-to-end about a central long axis to form a vacuumized envelope, the free end of each section constituting a metallic terminal and having a concentric flange extending toward the other terminal, the adjacent ends of the sections being a metallic junction ring having a concentric flange on each side extending toward the adjacent terminal flange, a concentric glass shell arranged between the mutually reaching flanges of each section and hermetically sealed therewith, a set of condenser plates mounted in the first section on the terminal flange thereof, a set of companion condenser plates mounted in the first section on the junction ring, and a metallic tube fixedly connected to the end terminals and extending out of the envelope at one end, said tube having an aperture in the wall thereof inside the envelope and being closed on the end outside the envelope.

8. A feed through condenser comprising a first and a second generally cylindrical section disposed end-to-end about a central long axis to form a vacuumized envelope, the free end of each section constituting a metallic terminal and having a concentric flange extending toward the other terminal, the adjacent ends of the sections being a metallic junction ring having a concentric flange on each side extending toward the adjacent terminal flange, a concentric glass shell arranged between the mutually reaching flanges of each section and hermetically sealed therewith, a set of condenser plates mounted in the first section on the terminal flange thereof, a set of companion condenser plates mounted in the first section on the junction ring, and a metallic tube within the envelope and having a bellows-like section and fixedly connected to the end terminals.

9. In a feed through condenser, a centrally disposed metal tube, metal terminal caps spaced apart on said tube and integrally united therewith, a metal mounting flange spaced between the caps and having a central opening through which the tube extends, means including glass

shells for forming with the end caps and mounting flange a closed envelope on which the mounting flange is supported and electrically insulated from the terminal caps, a plurality of condenser plates in the envelope and supported by and integrally united with one terminal cap, and a plurality of companion condenser plates in the envelope and supported by and integrally united with the mounting flange.

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