P. DUBILIER.

ELECTRICAL CONDENSER.

APPLICATION FILED MAY 2, 1916.

1,229,914. Patented June 12, 1917.

Fig. 1.

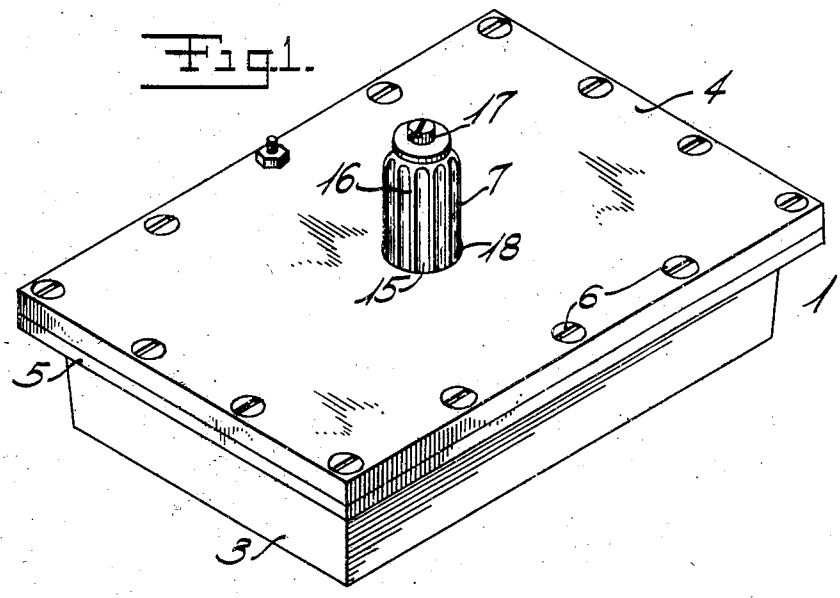
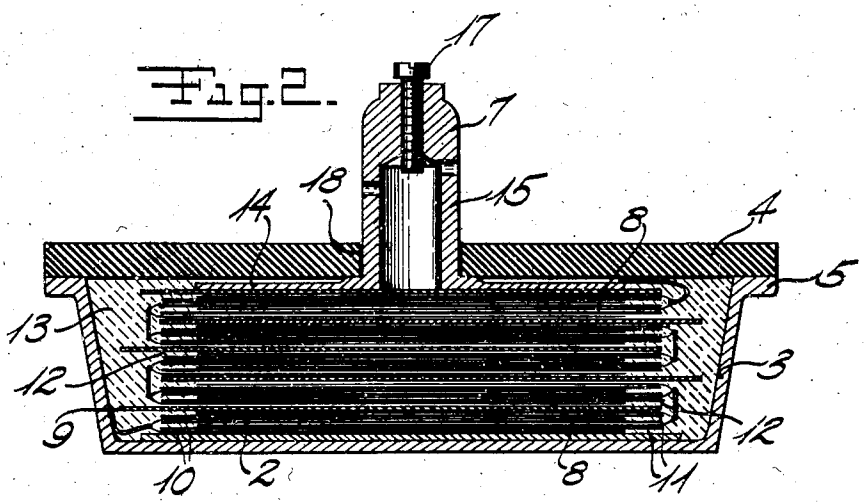


Fig. 2.



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UNITED STATES PATENT OFFICE.

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ELECTRICAL CONDENSER.

1,229,914. Specification of Letters Patent. Patented June 12, 1917.

Application filed May 2, 1916. Serial No. 94,943.

To all whom it may concern:

Be it known that I, PHILIP DUBILIER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electrical Condensers, of which the following is a specification.

My invention pertains to condensers for high tension circuits; and especially to such a condenser combined with a casing in such a manner as to facilitate the handling and operation of the condenser with the maximum convenience and efficiency.

The primary object of my invention is to provide a condenser which is of compact construction and small volume, and therefore capable of being moved about and set up for use without trouble or effort; and which is designed to obviate the likelihood of expansion when in service, and to radiate quickly the heat generated therein under normal practical conditions.

These and other objects and advantages of my invention will be made clearer in the following description, taken in connection with the accompanying drawings, and be precisely defined in the appended claims. But the disclosure herein is to be taken as illustrative only, as it sets forth merely the best form of my invention now known to me; and other embodiments than the one actually shown are possible in the practice of my invention. I therefore reserve the right to alter the shape, size, and arrangement of parts that might be utilized in the employment of the principle of my condenser, to the full extent indicated by the general meanings of the terms in which the claims are expressed.

On the drawings,

Figure 1 is a perspective view of a casing with a condenser therein, made according to my invention; and

Fig. 2 is a vertical longitudinal section through the parts shown in Fig. 1.

The same numerals identify the same parts throughout.

In the particular description of the drawings, the numeral 1 refers to a casing for inclosing and housing a condenser unit, indicated at 2. The casing 1 comprises two sections; one in the form of a body 3, of conducting material, such as metal; and the other in the form of a cover or closure 4, of insulation. The body 3 is preferably shaped like a pan or tray, with its sides sloping downward and inward to the bottom; and having a flange 5 around its top to enable the cover 4, which is simply a flat insulating plate, to be secured to the body by fastening devices such as screws 6. When disposed inside the casing 1, the condenser 2 will engage the bottom of the casing and be connected at one end to the body 3, which will thus constitute a terminal. At its other end the condenser 2 will be joined to a casting 7, which projects through the closure 4, and constitutes a second terminal for the condenser.

As illustrated in Fig. 2, the condenser is built up of sections 8, separated by insulating plates 9. Each section includes condenser elements, such as metal plates 10 and 11; between which are sheets of suitable insulation 12. The sheets 12 are of course somewhat larger than the plates 10 and 11, so as to overlap the latter at their inner ends, and along their sides. The plates 10 of the lowermost section are joined together at one end of the casing, such as the left end, for example, and connected to the body 3; and the plates 11 of the same section are joined together at the opposite end of the casing and connected to the plates 11 of the section next above. The plates 10 of this last-named section are joined together at the same end as the plates 10 below them, and connected to the plates 10 of the next upper section; and this method is pursued with the remaining sections. As a result, the condenser elements will all be in series. The plates 9 will be extended at both ends of the casing, between sections whose condenser elements are not joined at that end, but are connected to the elements of sections above and below. The plates 11 of the top section will be joined to the casting 7.

When the condenser 2 is made up by putting the plates 9, elements 10 and 11, and sheets 12 together, it is specially treated to eliminate air, moisture, and small spaces inclosing vacua between the plates 10 and 11 and the dielectric. For this purpose it will be impregnated with an insulating adhesive of suitable composition which is caused to

penetrate all through the condenser; expelling the air and moisture, and obliterating the vacua; and depositing itself in thin layers all over the plates 9 and sheets 12; whereby the plates 10 and 11 will have perfect contact with the insulation at every point. The adhesive will preferably be such as will solidify and make permanent coatings on the dielectric; and after the condenser is placed in the casing, it may be embedded in a mass of insulation indicated at 13; which will be melted and poured into the section 3, and finally allowed to set and harden.

The casting 7 to which the plates 11 of the topmost section 8 are joined comprises a compression element or plate 14; from which rises a projection or post 15. This post is hollow, and opens downward through the plate 14; and on its outside it is fluted or corrugated; providing longitudinal radiating ribs 16. At its outer end it bears a terminal 17. The projection extends through an opening 18 in the center of the closure 4, when mounted in proper position.

When the above construction is assembled, the condenser unit 2 will be located in the body 3, with the plates 10 of the lowermost section joined to the body; and with the casting 7 resting on the top of the condenser and joined to the plates 11 of the uppermost section 8, as above stated. The condenser will be embedded in the insulation 13 already referred to, which will fill all vacant spaces in the body 3; and when the cover 4 is fastened on the body, to close the casing, it will engage a shoulder on the casting 7 and force the element 14 downward to compress the condenser against the bottom of the casing. At the same time, the hollow post 15 projects out through the opening 18, and conducts away the heat from the inside of the casing, and radiates the same through the ribs 16.

In practice, the high potential side of the circuit in which the condenser is employed is united to the terminal 17, and the low potential side to the body 3, by a post or screw passing through the edge of the cover 4 into the flange 5. The cover 4, engaging the casting 7, causes the condenser to be compressed when the cover is tightly in place, and the condenser is thus prevented from expanding as it tends to warm up when in operation; moreover, the post 15 will conduct heat generated in the condenser out through the cover and radiate it from the ribs 16; thereby preventing excessive heating and the expensive force of the heat of operation from taking effect. As the body 3 also constitutes a terminal, both terminals of the condenser will be seen to have the greatest possible surface and the smallest possible mass; whereby not only will overheating be rendered impossible, but also the size of the condenser can be greatly reduced. Further, the condenser and casing will have very great mechanical strength; and only one terminal, namely, the terminal 17, instead of two, need be insulated; since it does not matter whether the body 3 is surrounded or supported by insulation when set up or not.

By causing the sides of the body 3 to slope outward from the bottom, the distance or space between the inside surface of the body 3 and the edges of the plates 10 and 11 gradually increases from the bottom to the cover 4. Since the sections near the cover 4 are at higher tension, this increased distance of the edges of the plates 10 and 11 from the sides of the body is required to keep the sections 8 of higher potential from bridging the gap between their edges and the body 3, and discharging around the lower potential sections.

The condenser sections, being in series, divide the total or line potential up among them; and the losses are consequently only a small fraction of what they would be if the condenser were constructed in a different way, as will be understood. The condenser sections 8 make up a simple and compact unit, which is easily built and most advantageously housed in the casing 1 for all the purposes which it is intended to serve.

Having described my invention, what I believe to be new and desire to secure and protect by Letters Patent of the United States is:—

1. The combination of a condenser comprising potential elements, and a pair of terminals for said condenser, one of said terminals including an element for compressing said condenser elements and holding the same tightly against the other terminal, the terminal including said compression element being of relatively small mass and having a relatively large amount of surface exposed to the exterior of the condenser.

2. The combination of a condenser and a pair of terminals therefor, one of said terminals constituting part of an inclosing casing, and the other terminal including a compression element, the terminals being arranged to compress the condenser between them, and being of relatively small mass and relatively large surface.

3. The combination of condenser elements and a casing therefor, the casing comprising a metallic body, and an insulating closure compressing said elements relatively highly within said casing, said casing constituting a terminal of the condenser.

4. The combination of a condenser having elements for relatively high potential and elements for relative low potential, and a casing for the condenser comprising a metallic portion shaped to have its interior

spaced at all points a greater distance from the high potential elements than the low potential elements.

5. The combination of a condenser having elements for relatively high potential and elements for relatively low potential, and a casing for the condenser comprising a bottom and sides of conducting material, the condenser being disposed centrally in the casing with its elements parallel to the bottom and its high potential elements farthest therefrom, said sides inclining outward away from the bottom, whereby the edges of said high potential elements will be spaced farther from the sides of the casing than the low potential elements.

6. The combination of a condenser, a casing therefor including a closure, a compression element for the condenser in the casing engaged by the closure, and a hollow projection on said element of relatively small mass and relatively large surface extending through the closure and carrying a terminal.

7. The combination of a condenser, a casing therefor comprising a metallic section constituting a terminal, a closure for the casing, and means in the casing extending through the closure and engaged thereby to exert pressure on the condenser, said means being of relatively small mass and relatively large surface, and constituting a second terminal.

8. The combination of a condenser, a casing therefor including a metallic section constituting a terminal, and means associated with the casing and condenser and cooperating with the casing to prevent expansion of the condenser and conduct heat from said condenser through to the outside of the casing, said means constituting a second terminal.

9. The combination of a condenser having elements for relatively high potential and elements for relatively low potential, a casing for the condenser comprising a section of conducting material constituting a terminal for the condenser, said section being shaped to have its interior surface spaced at all points a greater distance from the high potential elements than from the low potential elements, a closure for the casing, a compression element in the casing engaged by the closure, and a projection on said element of relatively small mass and relatively large surface, said projection extending through the closure to conduct away heat from the condenser, said projection also constituting a second terminal.

10. In a condenser, a group of condenser elements, terminals therefor engaging opposite faces of said group, and means whereby said elements are relatively highly compressed between said two terminals.

11. In a condenser, a casing having an insulating wall, a group of condenser elements therein, and a terminal therefor having a portion projecting through said wall, said portion being constructed to radiate heat.

12. In a condenser, a casing, a group of condenser elements therein, and a terminal therefor insulated from said casing and comprising a member acting to compress said elements relatively highly within said casing.

13. In a condenser, a group of condenser elements, and a terminal therefor having a ventilating passage leading from a point adjacent said elements.

14. In a condenser, a casing constituting one of the condenser terminals, an insulating cover therefor, a group of condenser elements therein, and a second condenser terminal having a bearing surface pressed by said cover into engagement with said elements, and having a portion projecting through said cover.

15. In a condenser, a casing constituting one of the condenser terminals, an insulating cover therefor, a group of condenser elements therein, and a second condenser terminal having a bearing surface pressed by said cover into engagement with said elements, and having a portion projecting through said cover, said projecting portion being designed to radiate heat.

16. In a condenser, a casing constituting one of the condenser terminals, an insulating cover therefor, a group of condenser elements therein, and a second condenser terminal having a bearing surface pressed by said cover into engagement with said elements, and having a portion projecting through said cover, said projecting portion being designed to radiate heat and having a ventilating passage therein.

In testimony whereof, I have signed my name to this specification, this 10th day of April, 1916.

PHILIP DUBILIER.