E. B. WHEELER & M. SULTZER.

ELECTRIC CONDENSER.

APPLICATION FILED JAN. 15, 1916.

1,200,063. Patented Oct. 3, 1916.

Fig. 1.

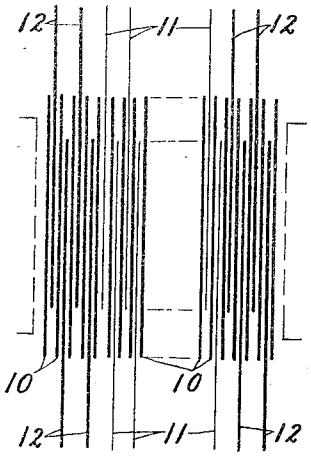


Fig. 2.

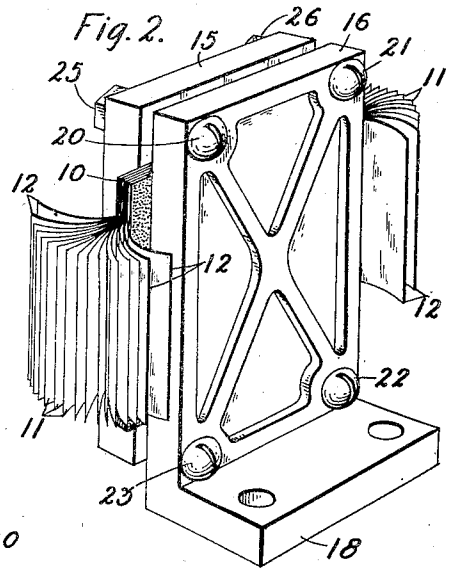


Fig. 4.

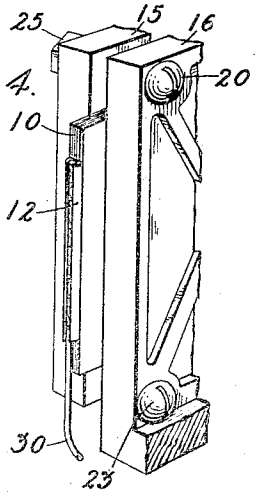


Fig. 3.

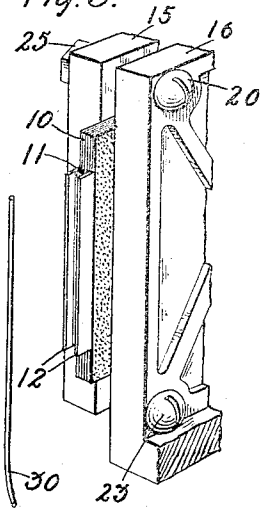
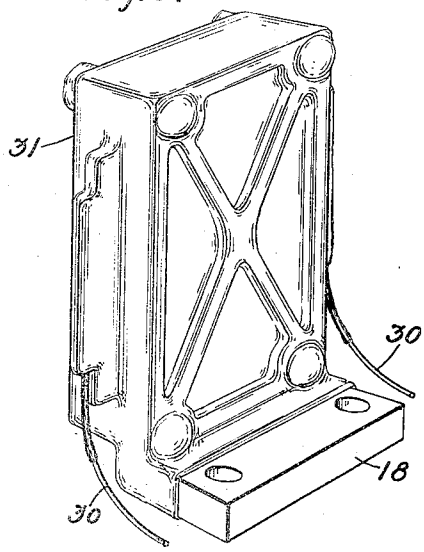


Fig. 5.



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by L. C. Garner, Atty.

UNITED STATES PATENT OFFICE.

EDMUND B. WHEELER, OF EAST ORANGE, NEW JERSEY, AND MORTON SULTZER, OF BROOKLYN, NEW YORK, ASSIGNORS TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ELECTRIC CONDENSER.

1,200,063. Specification of Letters Patent. Patented Oct. 3, 1916.

Application filed January 15, 1916. Serial No. 72,228.

To all whom it may concern:

Be it known that we, EDMUND B. WHEELER and MORTON SULTZER, citizens of the United States, residing at East Orange, in the county of Essex and State of New Jersey, and at Brooklyn, in the county of Kings and State of New York, respectively, have invented certain new and useful Improvements in Electric Condensers, of which the following is a full, clear, concise, and exact description.

This invention relates to electric condensers, the object being to construct a condenser which, during manufacture, can be adjusted to a given capacity with a high degree of accuracy, and which, during use, will maintain this capacity.

A further object is to construct a condenser on which temperature and humidity changes shall have as small an effect as possible.

A still further object is to construct a condenser which shall be rugged and shall be able to stand comparatively rough handling.

Heretofore in condensers of the stack type, it has been customary to use tin-foil as the conducting material between the successive layers of insulation. These sheets of tin-foil project at one side or the other, and are brought together to common terminals. In view of the very low tensile strength of tin-foil, such a terminal is very readily broken, and great care must be taken in their handling. In this invention, therefore, we replace part of the tin-foil sheets by some metal of higher tensile strength, such as copper or aluminum foil. It is not necessary that all the sheets shall be of this strong metal, but it is found that it is sufficient to have the last few sheets on each side of the condenser formed of this stronger metal. These outer sheets constitute the main support of the terminals which must be secured to the condenser. In this invention, also, clamping plates are used for compressing the sheets of insulating and conducting material to a high degree, and in a manner which absolutely prevents relative motion of the various sheets with respect to each other. It is found furthermore, that the use of a few sheets of conducting material of high tensile strength in these condensers, permits an accurate adjustment of the capacity of the condenser, as a whole, to a given desired value, this adjustment being accomplished by having the capacity a little larger than is desired for the final value, and then pulling out the stronger sheets until the desired capacity is obtained. It is found that in this manner a very accurate adjustment of capacity can be made. A further final and more accurate adjustment can then be obtained by a slight change in the pressure produced by the clamping plates.

The invention will be better understood by reference to the following specification and accompanying drawing, in which—

Figure 1 shows a cross-sectional view of parts of the condenser. Figs. 2, 3 and 4 show the condenser or parts thereof in perspective and at different stages of construction. Fig. 5 is a perspective view of the condenser on completion.

Referring to Fig. 1, there is shown the usual series of insulating and conducting sheets. The insulation may be of any suitable material, but mica has been found particularly satisfactory, and such sheets are shown at 10. At 11 there are shown the usual tin-foil sheets, and at 12 similar sheets of the same dimensions, but made of stronger metal, such as copper. The stack of sheets of insulation and conducting material are then placed between two clamping plates 15 and 16, which plates are then held together by means of bolts 20, 21, 22 and 23 which engage with corresponding nuts 25, 26. For convenience in mounting these condensers, it has been found desirable to supply one of the clamping plates with a mounting foot, as shown at 18. Measurements can now be taken of the capacity of the condenser, which capacity is known approximately from the number of sheets used, their area, and their average distance apart. In general, the number of sheets is so arranged that the capacity will come out slightly larger than is desired. By loosening the nuts on the bolts, one or more of the sheets 12 may then be pulled out slightly, and a second measurement can be taken upon the capacity, the process being repeated until the correct value is obtained. When this stage of the process of manufacture has been reached, the tin-foil and copper sheets are cut off within a small distance of the mica sheets. The copper is straightened and formed into a groove, into the bottom of which the tin-foil

is pressed, as indicated in Fig. 3. Into the groove thus formed, there is placed a terminal 30, preferably of copper. The groove is filled with solder and the copper foil soldered thoroughly to the terminal, in such a manner that a complete, intimate, metallic contact is established between the tin-foil, copper foil and the terminal. In general when this stage of the manufacture has been reached, there will be entrapped in various parts of the condenser, small quantities of air and moisture, and in order to insure constancy during use, it is desirable to remove any excessive quantity of these elements. Accordingly, the condenser is placed in a suitable furnace and is maintained at a high temperature to remove any traces of moisture and excessive quantity of air. After this stage of manufacture, a further test of the capacity of the condenser is made, and in general a small change will be found. An adjustment can be made for this change by means of the bolts holding the clamping plates together.

To prevent the entrance of moisture, which would alter the capacity of the condenser, it has been found desirable to seal the whole article with some material which is impervious to moisture. It has been found that a very suitable material for this, is such a compound as is disclosed in patent to Pruessman No. 1,127,513, February 9, 1915. The condenser is dipped into a molten mass of such a sealing mixture, and upon cooling a further measurement is made of its capacity. Again it will be found in general that a slight change in capacity has taken place. This change may be adjusted for by breaking the seal over the nuts and changing slightly the pressure of the clamping plates. A second immersion of the condenser into the sealing compound is then made, and it will be found that no further changes in capacity take place, and the device stands complete as shown in Fig. 5.

What is claimed is:

1. A condenser comprising alternate sheets of insulating and conducting material, the inside sheets of said conducting material being of tinfoil and the outside sheets being of strong metal foil and means for holding said sheets together with a fixed pressure.

2. A condenser comprising alternate sheets of insulating and conducting material, the inside sheets of said conducting material being of tinfoil and the outside sheets being of a strong metal foil adapted to be adjusted in area; clamping plates for said condenser and means for adjusting the pressure of said clamping plates to adjust the capacity of said condenser.

3. A condenser comprising alternate sheets of insulating and conducting material, the inside sheets of said material being of tinfoil and the outside sheets being of strong metal foil adapted to be adjusted in effective area; metal clamping plates for pressing said sheets together with a preliminary adjustable pressure, and means for sealing the whole.

4. A condenser comprising alternate sheets of insulating and conducting material, the inside sheets of said conducting material being of tinfoil and the outside sheets being of a metal of high tensile strength; metal clamping plates for pressing said sheets together with a preliminary adjustable pressure.

5. A condenser comprising alternate sheets of insulating and conducting material, the inside sheets of said conducting material being of tinfoil and the outside sheets being of a metal of high tensile strength; iron clamping plates held by screws for pressing said sheets together with a preliminary adjustable pressure.

6. A condenser comprising alternate sheets of insulating and conducting material, the inside sheets of said conducting material being of tinfoil and the outside sheets being of copperfoil; iron clamping plates held by iron screws for pressing said sheets together with an adjustable pressure and an insulating covering sealing the whole.

7. A condenser comprising alternate sheets of mica and conducting material, the inside sheets of said conducting material being of tinfoil, the outside sheets being of copperfoil; the alternate sheets of conducting material being connected to one terminal and the others being connected to another terminal, iron clamping plates for pressing said sheets together with an adjustable pressure and an insulating covering sealing the whole.

In witness whereof, we hereunto subscribe our names this 14th day of January A. D., 1916.

EDMUND B. WHEELER.
MORTON SULTZER.