A. PRUESSMAN.

CONDENSER.

APPLICATION FILED APR. 1, 1907.

923,889.

Patented June 8, 1909.

Fig. 1.

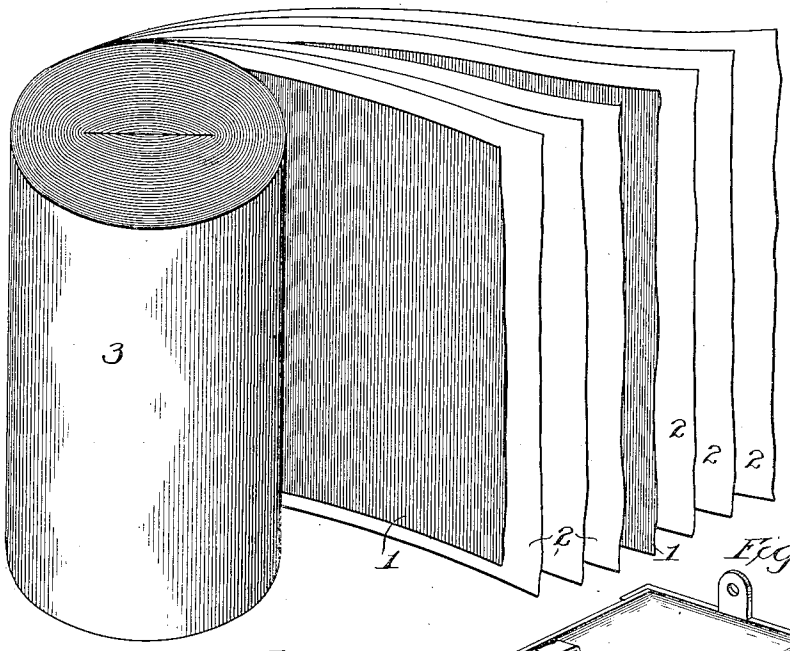


Fig. 4.

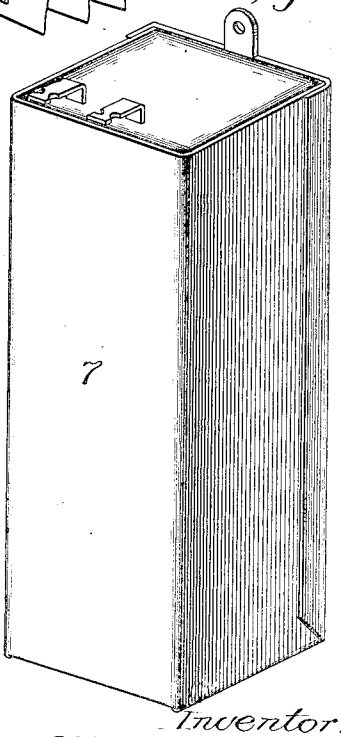


Fig. 3

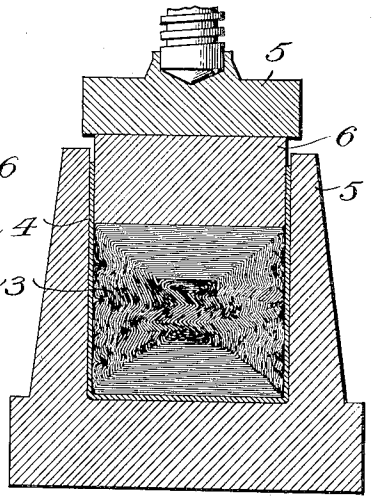
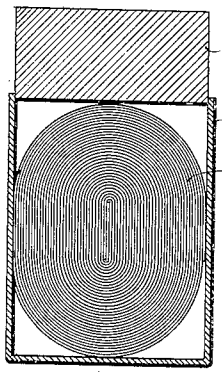


Fig. 2



Witnesses:

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UNITED STATES PATENT OFFICE.

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CONDENSER.

No. 923,889. Specification of Letters Patent. Patented June 8, 1909.

Application filed April 1, 1907. Serial No. 365,880.

To all whom it may concern:

Be it known that I, ALBERT PRUESSMAN, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Condensers, of which the following is a full, clear, concise, and exact description.

My invention relates to an electric condenser and the process of making the same. Its object is to provide a condenser which shall be very compact, cheap to manufacture and in which the breakdown voltage and insulation resistance are extremely high, while at the same time the condenser is of small size per unit capacity.

In carrying out my invention, I first assemble the strips of foil and dielectric by rolling them together into the form of an elliptical or oval cylinder. This roll or cylinder is first baked, then placed in a mold, where it is pushed down to an approximately rectangular shape by pressure applied in the direction of its longest axis. While held in the mold, it is boiled with melted paraffin wax or other insulating substance, and finally is placed in a press and subjected to pressure applied in the same direction as before. The mold prevents spreading at the sides, and the roll is thus pressed in the form of a prism. After the wax has been allowed to cool and set, this prism is removed from the mold and inclosed in the usual case to protect it and to prevent it from spreading apart.

My invention may be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a perspective view showing the strips of tin foil and paper dielectric assembled in an elliptical or oval cylinder; Fig. 2 is a cross section of the roll in the mold and before it has been subjected to the preliminary pressure; Fig. 3 is a cross section of the roll in the press, showing its structure after it has been finally compressed; and Fig. 4 is a perspective view of the completed condenser as inclosed in its protecting case.

Like parts are designated by similar characters of reference through the several views.

Two sheets of tin-foil 1, and two layers of insulating material, each shown as comprising three sheets of thin paper 2, are rolled into the form of an elliptical cylinder 3, as illustrated in Fig. 1. Said roll is then placed in a rectangular mold 4, open at the top, the width of said mold being approximately that of the shortest diameter of the roll. A rectangular block 6 is placed above the roll 3, and pushed down by hand, so that pressure is, through said block, exerted upon the roll 3 in the direction of its longest axis. After the condenser has been boiled in paraffin, the mold is placed in a press 5, and subjected to a final pressure exerted in the same direction as in the first instance. As a result of such pressure, the roll is compressed into an approximately square shaped prism, the layers assuming approximately the shape shown in Fig. 3. Thus if we consider the prism to be divided by diagonals into four parts, the layers of the upper and lower parts are in straight lines, while those at the sides have a wave-like formation. The pressure in the press 5 is maintained until the wax or paraffin has hardened, whereupon the condenser is removed and finally placed in a tightly fitting case 7, which is sealed in the usual manner.

I am aware of the fact that it has been proposed that sheets of paper and tin-foil be formed into a flat roll and then compressed into a still flatter form. I am also aware of the fact that in order to overcome the objections to said flat form of condenser and to get a compact condenser of approximately square cross section, it has been usual to fold such flat roll into an S-shape or U-shape, and then exert pressure upon the same. The difficulty with the latter form of condenser is that if a thick dielectric is used, as for example three sheets of paper, the folding becomes difficult and there is a tendency of the parts to unfold or spread apart after pressure, thus defeating the very purpose in view. It has been found that there is a considerable loss due to the unfolding of the condenser before it can be inserted in its case. In the condenser of my invention, however, the condenser remains in its pressed condition, and there is no loss from this source.

With the folded type of condenser, in obtaining two microfarad capacity in a given bulk, it has been found that the condenser withstands a maximum breakdown voltage of approximately only six hundred and fifty volts, ranging as low as three hundred volts. As it is customary to test condensers at five hundred volts, all below five hundred volts being rejected, it has resulted that a large proportion, approximately twenty per cent.

of such condensers, do not come up to the required standard. In the condenser of my invention, it has been found by repeated tests that the range of breakdown is from five hundred and seventy five to twelve hundred and fifty volts, or, in other words, that all pass the required five hundred volt test. This marked increase in efficiency is doubtless due largely to the increased thickness of the dielectric which the absence of folds permits me to employ.

I have found that, owing to the manner in which the pressure is applied in my invention, it is possible to compress a condenser having three sheets of insulating paper between the tin foil into the same compass as a condenser having the same amount of tinfoil separated by two layers of paper and which is compressed in the manner heretofore employed.

Hitherto it has been found necessary to employ a high and expensive grade of paper as a dielectric, for the reason that with only two sheets there is, unless such grade of paper be employed, extreme liability of flaws coinciding and thus reducing the dielectric strength and insulation resistance. With my invention, it is possible to employ three or more sheets of paper, thus reducing the possibility of defective spots or flaws thus coinciding, and rendering it practicable to employ a lower grade of paper and still obtain the same or even a higher dielectric strength and insulation resistance. It is further obvious that, since the folding of the roll is dispensed with, there is less handling of the same in the process of manufacture. For the foregoing reasons, the practice of my invention results in a very compact and efficient condenser, manufactured comparatively cheap.

I claim:

1. The process of making condensers, which consists in rolling the strips of foil and insulating material in an elliptical cylinder, and subjecting such cylinder to pressure in a rectangular mold, said pressure being imparted in a manner to shorten the longer diameter of the cylinder, and to compress said cylinder into approximately a prism.

2. The process of making condensers which consists in assembling the strips of foil and insulating material in a thick cylindrical roll of elliptical cross section, treating the same with melted wax, and subjecting the same to pressure in a mold, while allowing the wax to cool and set, the pressure being applied in such way as to shorten the diameter of the cylinder and to compress said cylinder into an approximately square prism.

3. The process of making condensers which consists in assembling strips of plates and dielectrics into a thick cylindrical roll of elliptical cross section, placing said cylindrical roll in a rectangular mold, and applying pressure in such a manner as to shorten the longer diameter of the roll and to compress said roll into a prism.

4. The process of making condensers which consists in assembling strips of plates and dielectrics into a thick cylindrical roll of elliptical cross section, placing said cylindrical roll in a rectangular mold having a width approximately equal to the shorter axis of the ellipse, and applying pressure in such manner as to shorten the longer diameter of the roll and to compress said roll into a prism.

5. The process of making condensers which consists in assembling strips of plates and dielectrics into a cylindrical roll, and applying pressure upon four sides of the roll, while said roll is in the cylindrical form, in such manner as to compress the same into a prism of approximately square cross section.

6. An electric condenser in the form of a rectangular prism, consisting of continuous alternate layers of plates and dielectrics, compressed on its four sides in such form that the diagonals of the rectangle divides the rectangular prism into four approximately triangular prisms, two of which have parallel straight layers, and the other two parallel wave-like layers.

In witness whereof, I, hereunto subscribe my name this 28th day of March A. D. 1907.

ALBERT PRUESSMAN.

Witnesses:
RALPH G. JOHANSEN,
RALPH W. INGERSOLL.