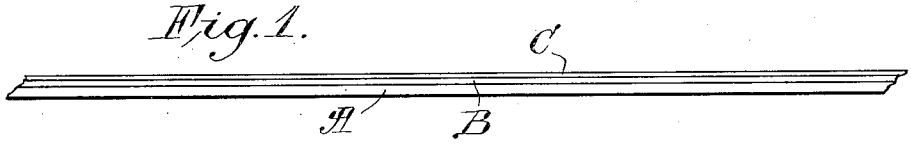
May 10, 1932. R. S. REYNOLDS 1,857,476

CONDENSER AND CONDENSER MATERIAL

Filed May 13, 1927

Fig. 1.



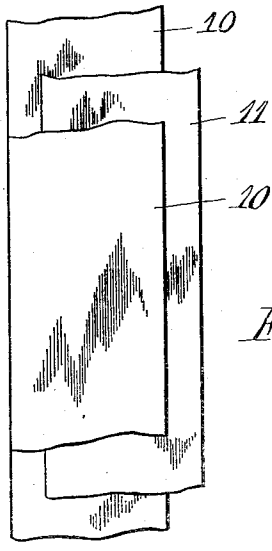


Fig. 2.

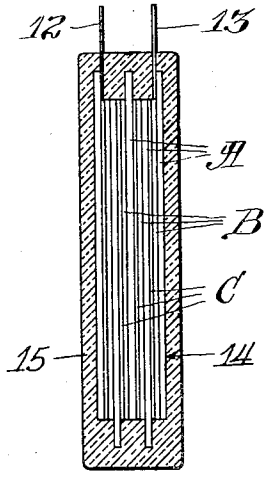


Fig. 3.

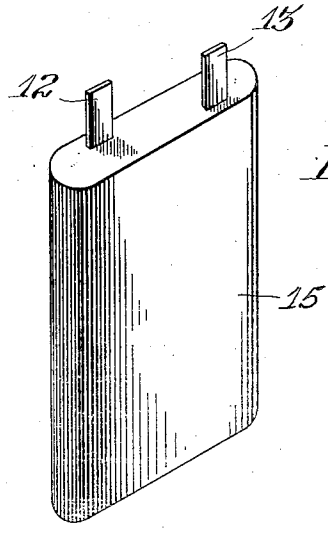


Fig. 4.

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UNITED STATES PATENT OFFICE

RICHARD S. REYNOLDS, OF LOUISVILLE, KENTUCKY

CONDENSER AND CONDENSER MATERIAL

Application filed May 13, 1927. Serial No. 190,985.

The present invention has to do with a new material adapted to be used in the manufacture of electrical condensers and to a novel condenser built therewith. The novelties of the invention include, among others, a new material, an unique condenser, improved means for insulating condenser plates or parts, and a condenser casing of a new order.

The objects of the invention comprise:

(*a*) A new material for condenser plates and having other utilities;

(*b*) A laminated material unique in the character of the dielectric which is made a part thereof; the insulation itself being of a marked advance in the art and adapted to many other uses;

(*c*) A new material suitable for rolled metal condenser and which permits of the elimination of paper and wax in the manufacture of such condensers;

(*d*) An unique condenser of increased capacity, greater compactness, and in which uniformity of manufacturing results is always obtainable;

(*e*) An improved insulation between parts of opposed polarity in a condenser;

(*f*) A novel casing for a condenser which prevents damage thereto and sustains and maintains the electrical characteristics thereof;

(*g*) A new type of covering for a condenser and of more effective protection, than wax coverings and insulations;

(*h*) The provision by practical means of insulation upon condenser metal parts in advance of the formation of the condenser;

(*i*) The arrangement of opposed condenser elements in closer and more regular proximity;

(*j*) The elimiation of moisture as a material factor in the production of condensers and the rendering of such devices less fragile;

(*k*) The disposition of an elastic and compressible dielectric between condenser plates; and

(*l*) The reduction of manufacturing and material arts in condenser production.

These objects and such other objects as may hereinafter appear are attained by the improved combination of constituents, the unique construction of parts, and the novel arrangement of elements, one with another.

A sheet of drawings accompanies this specification and is made a part thereof.

In said drawings:

Figure 1 is a magnified view in elevation of a sheet of the new material here described, the dielectrics thereof being represented schematically and as of much greater proportionate thickness than is actually employed;

Figure 2 is a fragmentary plan view showing two sheets of the material illustrated in Figure 1 arranged for producing one type of condenser;

Figure 3 is a diagrammatic vertical section through a condenser formed of the material illustrated in Figures 1 and 2, the purpose of the view being to illustrate the casing rather than the condenser; and

Figure 4 is a perspective view of a completed condenser in which the material and casing herein described are employed.

Like reference characters are used to designate similar parts in the drawings and in the description which follows.

In fixed condenser construction, foil or metallic strips insulated one from another and to receive opposed charges of electricity, are employed. The efficiency of the condenser depends in a great measure upon the insulation between the oppositely charged elements.

It is readily demonstrable that the maximum of efficiency from an electrical point of view is obtainable when the oppositely charged elements or sheets or plates are physically closely aligned, hence an insulation of extreme thinness approaches the ideal.

Unfortunately, until the present invention, dielectrics of such thinness could not be evenly or uniformly applied with the result that breakdowns have been constant in condensers where light insulation is employed. Moisture, too, has been a disagreeable factor during and after production and where paper and wax have been the materials between the electrically charged elements, the presence of moisture, even that absorbed

in a few moments from the atmosphere which enters a factory on a rainy day, has negatived the extreme measures of the manufacturer to build a condenser of thoroughly dry material.

The paper employed in condenser construction is expensive and difficult to thoroughly dry, and may unevenly absorb the wax used. Such wax, likewise, is very expensive and much of it must be used to exclude the possibility of moisture from reaching the space between condenser elements.

Further, the best of the wax and paper insulated condensers now produced are fragile and the finished article as well as the partially fabricated materials must be handled with the extreme of caution to prevent damaging or destroying jars or blows.

It is therefore proposed in the present invention to overcome each of the objections recited and to obtain a finished product which is compact, electrically highly efficient, sturdy, and readily manufacturable, possessing possibilities of low manufacturing cost and long life, and avoiding the hazards usually encountered in condenser production.

In the drawings the several figures disclose a sheet of foil or thin metal A which has been rolled to the thickness found most efficient for the capacity of the condenser to be produced.

Upon one (or both) sides thereof is an insulation comprising a layer of rubber B, which is in contact with the foil A, and a layer of shellac C upon the rubber coating B. Materials other than rubber and shellac possessing the same dielectric qualities and similar physical characteristics may be substituted for the shellac and for rubber.

If a heavier insulation is desired, a further coating of rubber may be applied to the first coating of shellac and the further coating of rubber covered with another shellac lamination. Further laminations in the same order may be employed. Except in unusual cases, the laminations need be applied upon one side of the foil A only.

The rubber coating or coatings B are mechanically applied from a proper solution of live rubber and mechanically spread until the film of live highly elastic and compressible rubber is extremely thin, so thin in fact that it is invisible upon the foil and quite transparent. Its presence is demonstrated by carefully tearing the foil sheet A when it will be found that an elastic, almost microscopically thin, sheet of dielectric is spread evenly over the surface of the foil. Suitable drying processes may be employed at this stage of manufacture to deprive the rubber coating B of its moisture without injuring the texture of the coating, its elasticity, or the evenness of the spread. In production, it is found that the spreading and drying may be a conjoint operation.

When dried, a coating of shellac C, preferably quick drying, is spread evenly over the rubber coating B, and mechanical means for insuring a complete, very thin and even coating are employed. The shellac coating C may also be deprived of its moisture by drying conjointly with its application over the rubber B.

If further coatings are to be applied, the same processes are employed until the desired thickness of insulation is secured. The application of shellac over the rubber prevents the tackiness or stickiness which might otherwise be present.

When completed, the sheet of material comprises the foil A to which closely adheres the extremely thin elastic and compressible laminations of rubber B and shellac C, the laminations generally being invisible to the eyes but their presence being demonstrable by carefully tearing the foil A.

The process of coating, herein generally referred to, is the subject matter of another application for Letters Patent, now in the course of preparation.

For building a condenser, two laminated sheets comprising the foil A, the rubber B, and the shellac C are rolled or wound as is conventional in condenser manufacture. In Figure 2, two such sheets, 10 and 11, are shown laid one upon the other in staggered alternate relation for winding into a condenser. Suitable mechanical winding machines may be used. To prevent shorting at the edges of the sheets 10 and 11 the staggered position shown in Figure 2 is useful, should other means for preventing such shorting not be employed.

The contact members or "leads" 12 and 13 may be added in any of the usual or conventional methods, such leads being shown in Figures 3 and 4.

A condenser comprising foil sheets, dielectrics, and leads would not be satisfactory or long lived if not encased or suitably housed.

One form of a housing is shown in Figures 3 and 4.

After the two sheets 10 and 11 are rolled into condenser form, the condenser 14 is shaped by pressure and any air between the sheets forced out. The compressibility and elasticity of the coatings B and C lends itself to effecting a complete removal of intervening air by compression without destructively distorting the dielectric coatings B and C.

When so shaped, the condenser is ready for jacketing or housing unless a further and precautionary drying is deemed advisable. The shellac and rubber possess no affinity for moisture and re-drying ordinarily may be avoided, thus reducing manufacturing costs.

Rubber may be used to form the housing. Such rubber is disposed in molds or other-

wise and about the condenser 14, preferably so that the liquid or soft rubber extends between the extension portions of sheets 10 and 11. It is to be here noted that the compressibility of the insulatory material B and C will cause such material to spread evenly beyond the edges of sheets A whereby to provide additional insulation at the edges of the said sheets 10 and 11.

The material for the jacket 15, after being evenly spread at the condenser ends, if rubber, is vulcanized or if of other material suitably hardened. Between the sheets 10 and 11, thin portions of the material of jacket 15 extend, providing complete insulation between adjacent sheets condenser material of the same polarity.

In this manner, a rigid and hard coating or casing 15 for the condenser 14 is obtained, such casing 15, making the condenser parts 10 and 11 immune to rupture or damage from blows or rough handling.

A casing of such character is not readily breakable and of course moisture will be forever removed as a possible factor in breakdown of the device. The leads 12 and 13 extends through the housing 15 and electrical connection may be readily established.

Special bases may be employed with the condenser when desired.

The vulcanizing of the casing material does not affect the sheets B or C, and such sheets remain elastic, and alive, the dielectric effect thereof not being impaired. Should such insulatory material, sheets B and C, subsequently harden, no pin holes or perforations can form therein because the insulatory material remains under the constant pressure, first applied when the condenser was shaped or formed.

I claim:—

1. A condenser comprising insulated metal strips staggeredly wound and having thereon a coating of microscopic thickness of live rubber overcoated with an equally thin coating of shellac, and a housing therefor of hardened rubber adapted to extend inwardly of the edges of and completely encase said foil strips in a rigid shell.

2. A condenser comprising insulated metal strips staggeredly wound and having thereon a coating of microscopic thickness of live rubber overcoated with an equally thin coating of shellac, and a housing therefor of hardened rubber adapted to extend inwardly of the edges of and completely encase said foil strips in a rigid shell, and in which said strips are compressed one against the other and are maintained in close proximity by said housing.

3. A condenser comprising closely compressed strips of metal foil in staggered arrangement, covered with a microscopically thin coating of live rubber and overcoated with an equally thin covering of shellac, and having an adhering housing of vulcanized rubber.

4. A condenser comprising closely compressed strips of metal foil in staggered arrangement, covered with a microscopically thin coating of live rubber and overcoated with an equally thin covering of shellac, and having an adhering housing of insulation material.

RICHARD S. REYNOLDS.