Dec. 10, 1940. A. T. CHAPMAN 2,224,288

ELECTRICAL CONDENSER

Filed Jan. 19, 1939

FIG. 1

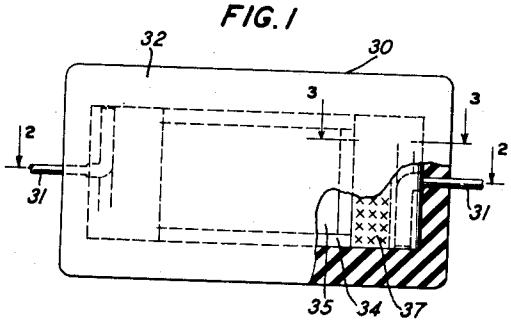


FIG. 2

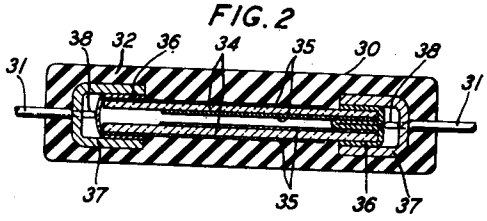


FIG. 3

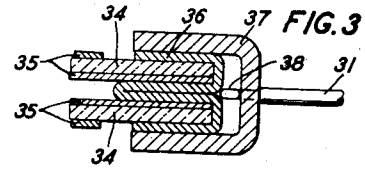


FIG. 4

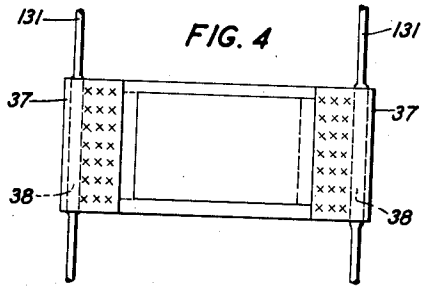


FIG. 5

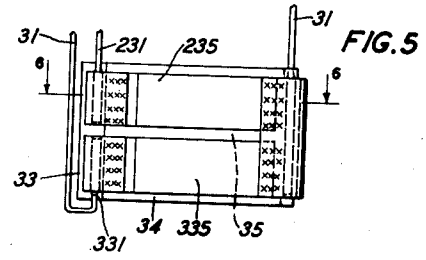


FIG. 6

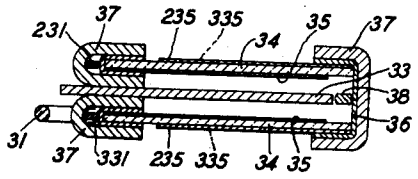
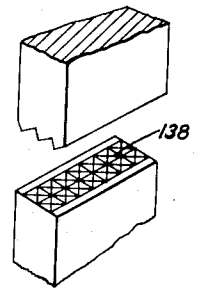


FIG. 7



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Patented Dec. 10, 1940 2,224,288

UNITED STATES PATENT OFFICE

2,224,288

ELECTRICAL CONDENSER

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Application January 19, 1939, Serial No. 251,745

2 Claims. (Cl. 175—41)

This invention relates to electrical condensers, and more particularly to electrical condensers of the type having laminae of mica with adherent films of metal.

Condensers of the general type referred to, especially in small sizes, find innumerable applications in the electrical arts. Because of their slightness of structure and fragility difficulties are sometimes encountered in providing suitable means for including in their structure appropriate members to act as electrical terminals or as mechanical supports or simultaneously as both.

An object of the present invention is to provide a construction for and a method of making electrical condensers to have members included therein to act as electrical terminals or as mechanical supports or simultaneously as both, with a minimum of structural elements and of volume occupied.

With the above and other objects in view, the present invention may be embodied in a condenser comprising one or more sheets or laminae of dielectric material such as mica, each provided with one or more closely adherent superficial films of metal on its surfaces and stacked together, a clamping member having a body of substantially C-shaped cross-section embracing an edge of the stack of metal filmed laminae, and an elongated member such as a wire or rod of metal or of substantially rigid non-metallic material embraced and clamped within the clamping member.

Other objects and features of the invention will clearly appear from the following detailed description of embodiments thereof taken in connection with the accompanying drawing in which the same reference numerals are applied to identical parts in the several figures and in which

Fig. 1 is a broken plan view of an electrical condenser in a molded housing and constructed in accordance with the invention;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a section on the line 3—3 of Fig. 1 and somewhat enlarged;

Fig. 4 is a detached plan view of another form of condenser without the housing;

Fig. 5 is a detached plan view of a third form of condenser without the housing;

Fig. 6 is a section on the line 6—6 of Fig. 5; and

Fig. 7 is a schematic view of the working surfaces of a tool employed in making the condensers.

This invention is closely related to the invention disclosed and claimed in copending application Serial No. 251,698 filed of even date herewith by the present inventor and another; and reference may be had to the disclosure of that application for details of construction and of methods of making not sufficiently detailed here.

As embodied in the structure of Figs. 1, 2 and 3, the invention is disclosed as comprising a condenser proper, generally indicated at **30**, and sealed into a block or housing **32** of suitable material, e. g. "Bakelite," molded directly on and around the condenser, with the terminal members **31** protruding thereupon.

The condenser proper comprises one or more sheets or laminae **34** of dielectric material of which one or more are each provided with a film **35** of metal closely adherent to its faces. These laminae are stacked together and a strip **36** of relatively soft metal is folded around the superimposed edges forming one face of the stack, and if necessary also between these edges in the manner disclosed in the copending application identified above. A clamp **37** having a body of C-shaped cross-section embraces the superimposed edges and folded metal strips and also a portion of the terminal member **31**, which latter extends through a perforation in the clamp **37**.

Some squeezing tool, pliers, press, stamp, hammer or the like, preferably with a working face such as illustrated at **38** in Fig. 7, is applied to the body **37** to compress this and its contents, and to lock the compressed parts together, thus making the permanent assembly disclosed in Figs. 2 and 3.

It is to be particularly noted that, especially in the sectional figures, the thickness dimensions of the mica **34**, the metal films **35**, the strips **36** and the clamp bodies **37**, have been strongly exaggerated relatively to the other dimensions in the figures. A typical structure such as shown in Fig. 2 might have a width and height of the order of 1½ to 2 inches, while in Fig. 3 the true thickness of the mica laminae **34** would be of the order of 0.0010 to 0.0015 inch, that of the foil **36** of the order of 0.0005 to 0.0010 inch, and the thickness of the clamp body **37** is of the order of 0.015 inch, while the thickness of the metal films **35** may range from a relatively few molecules to something measured in one or two thousandths perhaps.

The terminal member shown at each end of the condenser proper in Figs. 1, 2 and 3 may be a piece of wire of any suitable metal. If sufficiently

soft, the wire will be flattened as at 38 by the assembling operation just described and thus still more securely locked in place. If the terminals 31 are of hard and rigid material, to provide stiff mechanical supporting means as well as electrical connections, the wire will preferably be pre-flattened over the portion 38 before being inserted into the body 37 for assembly.

The use of this general construction of the condenser and this particular construction for the form and mounting of the terminals enables the provision of a considerable variety of useful forms of support and terminals, of which typical samples are shown in the remaining figures. Thus Fig. 4 shows a condenser identical with the condenser 30 in all ways except in the terminal members 131. Here these are straight wires or rods passing through the condenser from side to side and through the clamps 37 from end to end, thus permitting the condenser to be bridged across two circuits by simply inserting one terminal into each.

Figs. 5 and 6 show a somewhat more elaborate and complex structure. Here there are shown two independent metal films 235 and 335 on the outer face of each lamina 34 and a single film 35 on the inner face of each. Thus it comprises two condensers in one, both having the single right hand terminal 31 in common and each having also an individual terminal 231 and 331, respectively, and the whole being extremely compact as to volume and smooth as to exterior form.

The laminae 35 are commonly of mica, but may be of any other suitable dielectric material, e. g. for certain purposes they might be of one of the artificial resins or other moldable plastics such as "Bakelite" or "Cellophane," or for other purposes the pressure of the soft strip 36 inter-leaving the laminae and cushioning them at points of pressure of the clamps would permit the use of glass laminae.

The embodiments herein disclosed are illustrative and may be variously modified and departed from without departing from the spirit and scope of the invention as pointed out in and limited only by the appended claims.

What is claimed is:

1. An electrical condenser comprising a plurality of rigid laminae of dielectric material stacked together in a pile, a metal member on each face of each lamina to act as a condenser plate, a thin strip of soft metal extending across one face of the pile and formed with a flat loop extending between adjacent faces of adjacent laminae and there making electrical contact with the condenser plate members on the said faces and the said strip being further folded over the outer faces of the outer laminae of the pile, a rigid metal clamping member having a body of C-shaped cross-section and enclosing and clamping together the strip and the edge portions of the pile of laminae over which the strip extends and making electrical contact with the strip, and an elongated metal terminal member having a portion contained in the clamping member body parallel to the fold thereof so that the terminal member is rigidly held by the clamping member both in electrical connection with the condenser plate member and in fixed mechanically supporting relation to the laminae, the terminal member extending out beyond the clamping member in two directions from the portion of the terminal member held in the clamping member.

2. An electrical condenser comprising a plurality of rigid laminae of dielectric material stacked together in a pile, a metal member on each face of each lamina to act as a condenser plate, a thin strip of soft metal extending across one face of the pile and formed with a flat loop extending between adjacent faces of adjacent laminae and there making electrical contact with the condenser plate members on the said faces and the said strip being further folded over the outer faces of the outer laminae of the pile, a rigid metal clamping member having a body of C-shaped cross-section and enclosing and clamping together the strip and the edge portions of the pile of laminae over which the strip extends and making electrical contact with the strip, and an elongated metal terminal member having a portion contained in the clamping member body parallel to the fold thereof so that the terminal member is rigidly held by the clamping member both in electrical connection with the condenser plate member and in fixed mechanically supporting relation to the lamina, the terminal member extending out beyond the clamping member in two directions from the portion of the terminal member held in the clamping member, in combination with a second like arrangement on another face of the pile of a soft metal strip and a rigid C-shaped metal clamping and a terminal member held in and extending out in two directions from the clamping member, the parts being so proportioned and arranged that the condenser may be bridged across two electrical circuits by connecting the two ends of the one terminal member in the one circuit and the two ends of the other terminal member in the other circuit.

ALAN T. CHAPMAN.