May 9, 1939. E. M. MEGGENHOFEN 2,157,715

ELECTRICAL CONDENSER

Filed May 25, 1936

Fig. 1

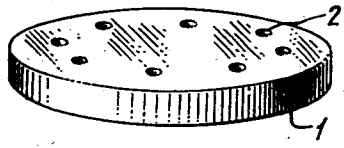


Fig. 2



Fig. 3

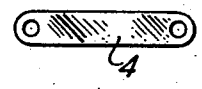


Fig. 4

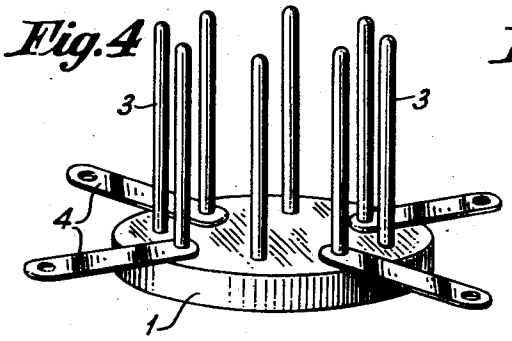


Fig. 5

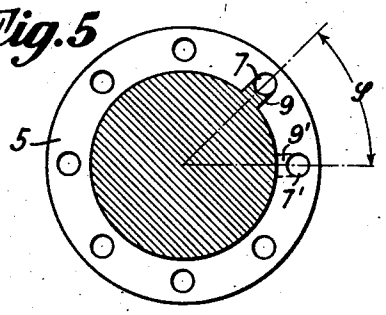


Fig. 7

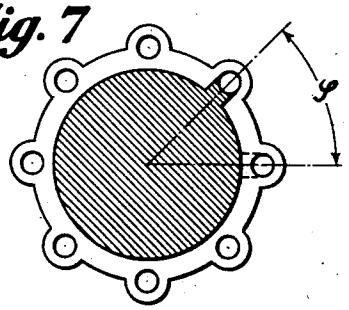


Fig. 6

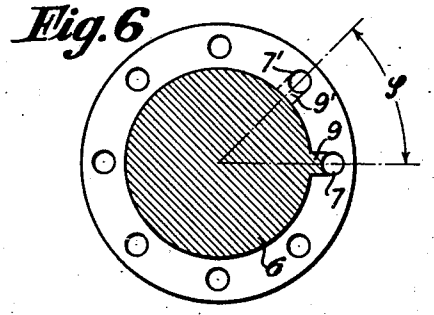


Fig. 8

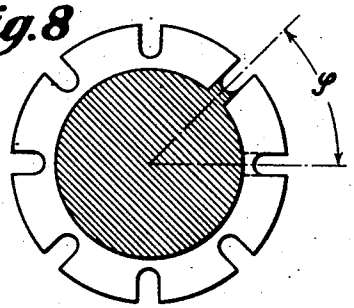
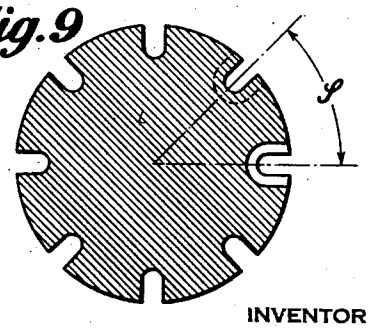


Fig. 9



INVENTOR
EDUARD MAYER MEGGENHOFEN
BY H. B. Groves
ATTORNEY

Patented May 9, 1939

2,157,715

UNITED STATES PATENT OFFICE

2,157,715

ELECTRICAL CONDENSER

Eduard Mayer Meggenhofen, Berlin, Germany, assignor to Telefunken Gesellschaft für Drahtlose Telegraphie m. b. H., Berlin, Germany, a corporation of Germany

Application May 25, 1936, Serial No. 81,657
In Germany May 25, 1935

6 Claims. (Cl. 175—41)

The present invention is concerned with an electrical condenser which distinguishes itself by its great mechanical strength and ruggedness as well as by its compact construction. From the same construction elements it is an easy matter to make, according to desires or requirements, series, parallel, or series-parallel organizations of the capacitive parts.

In what follows, the construction of the condenser here disclosed shall be described by reference to the attached drawing, in which Fig. 1 is a perspective view of the condenser base plate;

Fig. 2 is a detail of a securing bolt;

Fig. 3 is a detail of a terminal lug;

Fig. 4 is a perspective view of the assembled bolts and terminal lugs;

Fig. 5 is a detail of an insulating disc of this invention;

Fig. 6 is another detail of an insulating disc of this invention;

Fig. 7 is a further modification of an insulating disc of this invention;

Fig. 8 is a detail of an insulating disc having notches instead of holes; and

Fig. 9 is a detail of an insulating disk similar to Fig. 8, except that both flat faces are metallized. The most important constituents of the condenser comprise: a dielectric base (plate) or mounting plate with several holes; metallic bolts which are secured in all or in some of the holes before mentioned, and dielectric disks acting as the capacitive construction units. Substantial portions of the surface area upon both faces of the said disks are metallized.

Referring to Fig. 1, 1 denotes the base plate made of a suitable dielectric material and having holes or recesses 2. In all or in some of the latter are secured metallic bolts 3 (Fig. 2). If such securing depends on screw action, then it will be recommendable to fit female screw threads made of metal into the dielectric plate 1. If desired, current supply or terminal lugs 4 may be provided for some or for all of the bolts (see Fig. 3) which when the bolts are screwed home are clamped between them and the mounting or base plate, and which are soldered together with the said bolts.

Fig. 4 shows the base plate 1 assembled with bolts 3 and lugs 4. Upon the structure or cage thus formed are fitted the disks which serve as capacitive units.

A disk of the said sort is shown, for instance, in Fig. 5. The same consists of a suitable dielectric material; preferably ceramic materials could be used. Most advantageous are ceramic materials which nowadays are manufactured with an admixture of "rutil", and which have a dielectric constant of over 80. The dielectric body 5 of the disk is covered upon both of its faces with metallized layers or coats 6 to a substantial extent. Each of the disks has a number of holes (in Fig. 5 eight such holes are shown), and some of these holes, for instance, holes 7 and 7' are metallized on their inside walls. The metallized layer of the inside wall in the case of hole 7 is electrically associated with the metallized coat 6 of the top face, for instance, by that it is connected therewith by a narrow strip of metallized surface 9. In a similar manner, the inside metallization of hole 7' is united with the metallized coat of the bottom face, for instance, by way of the strip 9'.

Now, the disks are so placed uuon the supporting structure (or cage) shown in Fig. 4 that the bolts will pass through the holes in the disks or circular plates. To insure satisfactory contact, and firm mechanical cohesion, the metallized inside walls of the holes are soldered together with the bolts passed therethrough. All that is necessary with the said end in view is to hold the soldering iron or some other suitable source of heat against the top ends of the bolts. By virtue of the high heat conductivity of the bolts, solder disposed in the neighborhood of the holes will thus be caused to melt and thereby fill the gap between the walls of the holes and the bolts completely. With such a procedure, the dielectric material of the disks is but little endangered.

In assembling the pile of disks there is no need for spacing the various disks apart by special spacer means. The preferable plan is to place the disks so close in superposed relationship that the bottom metallized face of each disk comes to make intimate contact with the top metallization of the subjacent disk.

If all of the disks as condenser units are to be connected together in parallel, then the position of the metallized holes 7' and 7 of each succeeding disk in reference to the preceding ones must be staggered an angle ϕ formed by the disk radii of two neighboring holes. For instance, if any one of the bolts 3, Fig. 4, is designated as bolt No. 1, and the bolt following it in anti-clockwise direction as bolt No. 2, the next one in the same direction as No. 3, then the disks are superposed approximately as follows:

The first disk is laid upon the bottom or mounting plate in such a way that the metallized hole 7' which has the polarity of the bottom coat of this disk contains the first bolt and metallized hole 7 which has the polarity of the top coat of the disk, the second bolt. The next plate is fitted on staggered to the said angle in such a way that hole 7' contains the second bolt and hole 7 the third bolt. The third disk is so fitted that its hole 7' contains the third and its hole 7 the fourth bolt. If, then, the first, third, fifth and seventh bolts by suitable connections are electrically connected, and similarly the second, fourth, sixth and eighth bolts are electrically

united, then all of the construction units are connected in parallel with one another.

If a series connection of the construction elements is desired, then there is no necessity to electrically connect with one another the constituent bolts. In this manner, with the exemplified embodiment shown in Figs. 4 and 5, it would be feasible to build up with eight bolts a series arrangement comprising seven disk elements, with the current leads of different polarity being attached at the first and eighth bolt or terminal.

It is also feasible to build a series-parallel assembly in an easy manner.

If it is desired that in the parallel arrangement only two bolts, say, the first and the second bolt, are subject to electrical potential so that the other bolts would be dispensable, then construction elements, i. e. disks alternating in type must be placed upon one another. In one type (as Fig. 5), the hole 7 belonging to the top coat in respect to the hole 7' pertaining to the bottom coat is staggered or shifted a positive angle φ; in the other type (Fig. 6) by a negative angle φ. If the first bottom-most plate is of the type Fig. 5, the same is laid in such a way that the hole 7' contains the first and hole 7 the second bolt. Laid thereon is a plate of type Fig. 6 so that its hole 7 contains the first and hole 7' the second bolt. The third, fifth, seventh plates etc. are of the same type and they occupy the same position as the first; the fourth, sixth, and the eighth plates, etc., on the contrary are of identical type and they occupy the same position as the second plate. In this form of construction, as above pointed out, only two bolts are required. However, for the sake of greater ruggedness, also a greater number of bolts may be used. Also, these (electrically superfluous) bolts may be soldered together with the holes through which they pass, provided that these holes have metallized inside walls; but there is no need for connecting these inside walls with the coats of the disks electrically (for instance, by the metallized strips above indicated).

It is also feasible to use mounting or base plates as well as condenser plates or coats of a shape other than that here suggested, and all of such shape modifications would fall inside the scope of the invention. For instance, the disks could have a form as shown in Figs. 7 and 8. In the latter form, the holes through which the bolts are passed are shown in the form of notches being open in circumferential direction.

Neither is it absolutely necessary to make the disks or coats circular or to choose the diameter of the latter smaller than the distance of diametrically opposite bolts. If the faces of the disks are to be utilized as far as feasible for capacity purposes, and if the condenser is intended only for low voltage, then the flat faces of the disks may be metallized up to the very edge or rim, or nearly so. But in the case of each coat the metallization should not reach all the way to the edge of the hole or notch with inside metallization through which the bolt of opposite polarity is passed. This form of construction is illustrated in Fig. 9.

What is claimed is:

1. An electric condenser comprising a circular mounting plate having a plurality of threaded apertures on the same radius, a plurality of metallic bolts forming a cage-like structure secured by the threads in said apertures, a plurality of circular discs of ceramic material having a substantial portion of both flat faces metallized inside the area occupied by said apertures, the remaining area forming an uncoated rim, said discs being provided with openings through which said bolts pass, and a metallized strip electrically connecting at least one of said metallized faces and said bolts.

2. An electric condenser according to claim 1 in which the inside wall of at least one of said threaded apertures is metallized and soldered to at least one of said bolts passing through said aperture to make electrical connection thereto.

3. An electric condenser comprising a circular mounting plate having more than three threaded apertures on the same radius, a plurality of metallic bolts forming a cage-like structure secured by the threads in said apertures, a plurality of circular discs of ceramic material having a substantial portion of both flat faces metallized inside the area occupied by said apertures, the remaining area forming an uncoated rim, said discs being provided with openings through which said bolts pass, and a metallized strip electrically connecting at least one of said metallized faces and said bolts.

4. An electric condenser comprising a circular mounting plate having a plurality of threaded apertures on the same radius, a plurality of metallic bolts forming a cage-like structure secured by the threads in said apertures, a plurality of circular discs of ceramic material having a substantial portion of both flat faces metallized inside the area occupied by said apertures, the remaining area forming an uncoated rim, said discs being provided with openings through which said bolts pass, a metallized strip electrically connecting at least one of said metallized faces and said bolts, said connecting strip of a top metallized face being shifted with reference to the bottom metallized face of an adjacent disc.

5. An electric condenser comprising a circular mounting plate having a plurality of threaded apertures on the same radius, a plurality of metallic bolts forming a cage-like structure secured by the threads in said apertures, a plurality of circular discs of ceramic material having a substantial portion of both flat faces metallized inside the area occupied by said apertures, the remaining area forming an uncoated rim, said discs being provided with a plurality of notches open at the periphery of said disc through which said bolts pass, and a metallized strip electrically connecting at least one of said metallized faces and said bolts.

6. An electric condenser comprising a thick mounting plate having a plurality of threaded apertures, a plurality of metallic bolts secured in said apertures, a plurality of flat discs of ceramic material having a substantial portion of both flat faces metallized inside the area occupied by said apertures, the remaining area forming an uncoated margin, said discs being provided with slots through which said bolts pass, a metallized strip electrically connected at at least one of said metallized faces and said bolts, said connecting strip of a top metallized face being shifted with reference to the bottom metallized face of an adjacent disc.

EDUARD MAYER MEGGENHOFEN.