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W. DUBILIER

1,821,055

ELECTRICAL CONDENSER

Filed June 10, 1924

FIG. 1

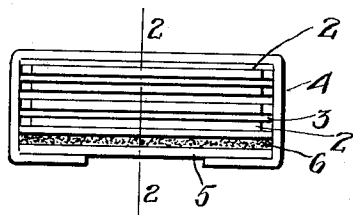


FIG. 2

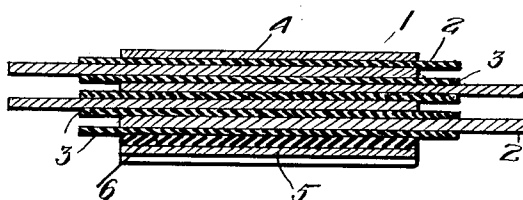


FIG. 3

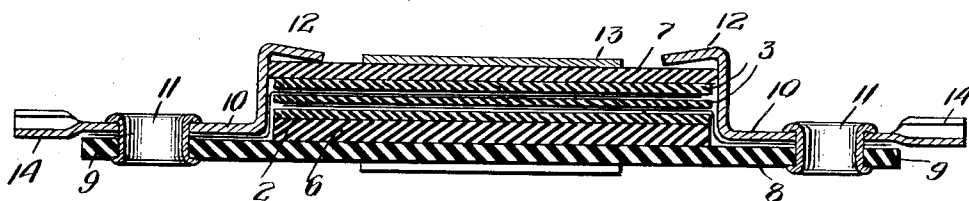
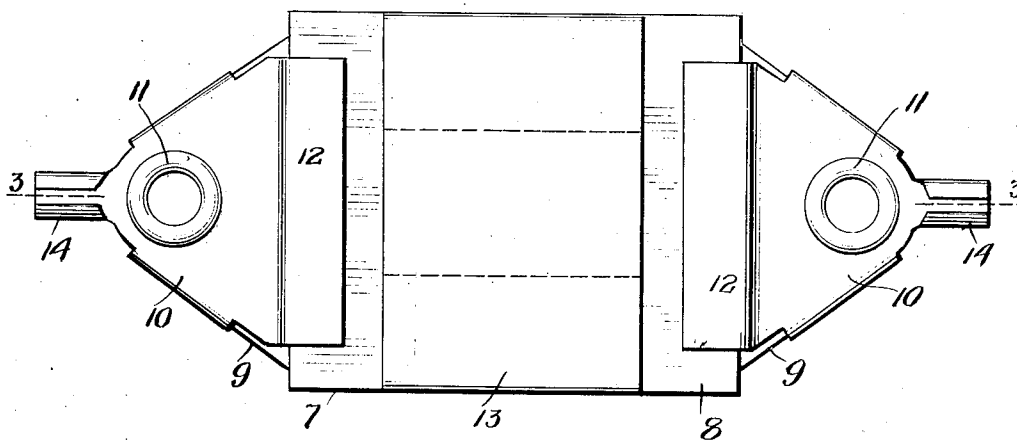


FIG. 4



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ELECTRICAL CONDENSER

Application filed June 10, 1924. Serial No. 719,114.

I have invented certain improvements in electrical condensers, for use in oscillatory circuits, and especially radio apparatus.

In the manufacture and design of such condensers, particularly when the capacity of the condenser is to be constant, sheets or plates of electrically conductive material separated by sheets of insulation are often assembled to form the stack or body of the condenser; and to maintain the capacity of the condenser at a fixed value, the sheets must be held in firm engagement over their total area. The formation of cracks or air spaces, caused by the separation of any of the sheets, must be prevented by every possible means, because such cracks or spaces, even if exceedingly minute, with the high frequencies employed in signalling by radio, will inevitably give rise to great variations in the effect of the condenser, and often render the entire apparatus unserviceable.

In the practice of this invention, I incorporate in the condenser superior and effective means for keeping the stack tightly compressed, and for distributing the force of compression with the greatest uniformity over the area of the stack. Thus interior displacements and the occurrence of spaces or voids in the stack between the sheets are wholly prevented.

The nature of the invention is set forth in the following description and the accompanying drawings, which disclose one or more constructions in which the principle of my invention is embodied. Of course, I reserve the right to make changes that come within the scope of the invention as defined by the broad terms of the appended claims.

On the drawings,

Figure 1 is an end view of one form of a condenser according to my invention;

Figure 2, a longitudinal section thereof;

Figure 3, a similar section of another form of condenser; and

Figure 4, a top plan of the condenser of Figure 3.

On the drawings, the same numerals identify the same parts throughout.

The improved condenser, as shown in Figures 1 and 2, comprises a stack or body 1,

consisting of thin plates or sheets of some electrically conductive material, such as metal foil 2, separated by insulation, such as sheets of mica 3. The top and bottom plates of the stack 1 are, of course, of insulation, and the stack is encircled by a band clamp 4. This clamp 4 extends over substantially the whole of one face of the body and is bent against the sides, with its extremities turned down upon the opposite face, this opposite face being covered by a face plate 5, with which the extremities of the clamp make contact along the edges. Under the face plate and against the adjacent face of the stack 1, I place a cushion 6 of some suitable yielding and resilient material of about the same size as one of the mica sheets; so that when the clamp is tightened, it will force the opposite faces of the stack towards each other, and through the plate 5 it will exert suitable pressure upon the cushion 6. I prefer rubber as the best material for the cushion 6, because rubber is uniformly resilient and yielding throughout, and can just as easily be compressed in the direction of its thickness, as in the direction of either its length or breadth. Therefore, when the clamp 4 is tightened, the pressure which it will cause to be exerted upon the sheets of metal foil and mica will be evenly distributed over the entire area of the sheets of the stack 1, and slight inequalities in the bending of the clamp or in the compression that might otherwise be exerted at various points in the stack, will be compensated, and the resultant compression will be equalized over the total surface of the stack and the sheets constituting same.

Figures 3 and 4, which illustrate a modification, show a condenser comprising two face plates, such as a cover plate 7 and a base plate 8, the latter having extensions 9 at its opposite ends. These cover plates are of some strong and stiff insulating material, such as bakelite; while the face plate 5 above mentioned, is preferably of metal. The stack 1 lies between the plates 7 and 8, and to the extensions 9 are fastened clips 10 by means of suitable devices such as eyelet rivets 11; and each of these clips has a portion bent up and terminating in a flange 12 which over-

laps the adjacent edge of the cover plate 7. On one face of the stack and directly beneath either the plate 7 or on the plate 8, I place a cushion 6 as before, and around the two plates is a band clamp 13, which lies against the top plate and is bent down across the sides and over upon the outer surface of the base plate 8. The extremities of the clips 10 may have conductor fastening lugs 14. In this type of condenser, both the clamp 13, and the clips 10 are caused to engage the plates tightly, the clamp forcing the two plates 7 and 8 towards each other, and the clips pressing down the ends of the plate 7. In this construction, the cushion 6 can be compressed to a greater extent, and not merely beneath the clamp 13, but along its edges also.

Of course, half of the sheets of foil 2 are of one polarity, and the other half are of opposite polarity. The ends of the two groups of sheets of foil of different polarity are shown as projecting out at the ends of the condenser, in Figure 2, to be united to the terminals of an electric circuit, and in Figures 3 and 4, the sheets of foil of one polarity will project out to be secured beneath the adjacent clip 10; the remaining sheets of different polarity projecting out over the opposite extension 9 to be secured beneath the other clip 10, and the condenser can be put in circuit by joining electrical conductors to the clips by means of the lugs 14, or by fastening them with or without screws to the eyelet rivets 11. Of course in practice the sheets 2 and 3 can be made as thin or as thick as desired, and the condensers in any required sizes.

Having described my invention, what I believe to be new and desire to secure and protect by Letters Patent of the United States is:—

1. A condenser comprising a pair of face plates, a stack consisting of sheets of electrically conductive material separated by insulation between said plates, one of said plates having extensions at its opposite ends, clips secured to said extensions and engaging the adjacent edges of the other plate, a clamp embracing the condenser and lying between said clips, and a plane cushion of uniformly yieldable and resilient material disposed against one face of the stack, to cooperate with the clamp and enable pressure to be exerted evenly over the entire area of the sheets of conductive material and insulation when said clamp and said clips are tightened.

2. In a condenser structure a body comprising electrically conductive elements separated by dielectric material, and elastic means in contact with said stack for maintaining pressure directly on the stack over substantially the entire area thereof, whereby the condenser body is maintained in a state of uniform compression.

3. In a condenser structure a body comprising electrically conductive elements separated by dielectric material, and a cushioning means in contact with said stack for exerting pressure directly on the stack in such manner that a uniform pressure is maintained at each point over the entire area of the stack regardless of irregularities in the same.

4. A condenser comprising a body of armature members separated by dielectric material, a cushion of resilient material in contact with said body, said cushion serving to apply uniform pressure at each point over the area of the body adjacent thereto, and means for maintaining pressure on said cushion.

5. A condenser comprising a stack of armature members separated by dielectric material, a layer of uniformly elastic material in contact with said stack, said layer serving to exert a uniform degree of pressure over the entire active area of the stack, and clamping means for maintaining pressure on said elastic material.

6. In a condenser, a body having a plurality of armature members separated by dielectric material and resilient means in contact with the body for exerting pressure at each point over the area of the body adjacent thereto, the pressure exerted at any point being independent of the pressure exerted at every other point.

7. A condenser comprising a body of armature elements separated by dielectric material, a bearing plate for the body, a cushion of uniformly compressible and resilient material between the bearing plate and body, and clamping means for exerting pressure on the said bearing plate, cushion and body, whereby an even degree of pressure is exerted over the entire active area of the body to maintain constant the capacity of the condenser.

8. A condenser comprising a stack of armature elements separated by dielectric material, a face plate for the stack, a cushion of uniformly compressible and resilient material between the face plate and the stack, and a pressure clamp encircling the condenser and cushion and engaging the face plate, whereby an even degree of pressure is exerted over the entire active area of the stack to maintain constant the capacity of the condenser.

9. A condenser comprising a stack of sheets of electrically conductive material separated by dielectric material, a cushion of resilient rubber adjacent said stack, bearing plates enclosing said stack and cushion, and clamping means for exerting pressure on said bearing plates, whereby an even degree of pressure is exerted over the entire active area of the stack to maintain constant the capacity of the condenser.

10. A condenser comprising a stack of
sheets of electrically conductive material
separated by dielectric material, a resilient
rubber cushion adjacent said stack, bearing
members enclosing said stack and cushion,
and clips secured to one of said bearing mem-
bers and engaging the adjacent ends of the
other bearing member whereby an even de-
gree of pressure is exerted over the entire
active area of the condenser stack to main-
tain constant its capacity.

In testimony whereof I affix my signature.

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