F. KRATZ.

ELECTRICAL CONDENSER AND METHOD OF MAKING IT.

APPLICATION FILED JAN. 26, 1917.

1,385,379. Patented July 26, 1921.

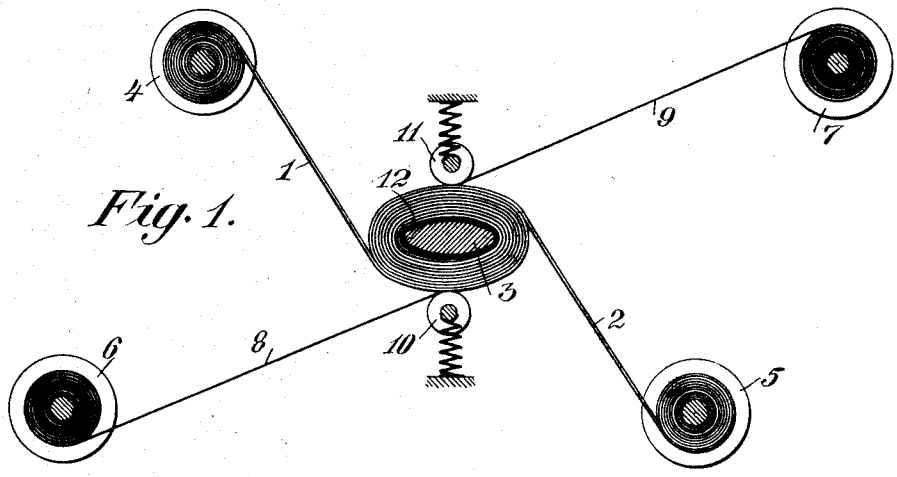
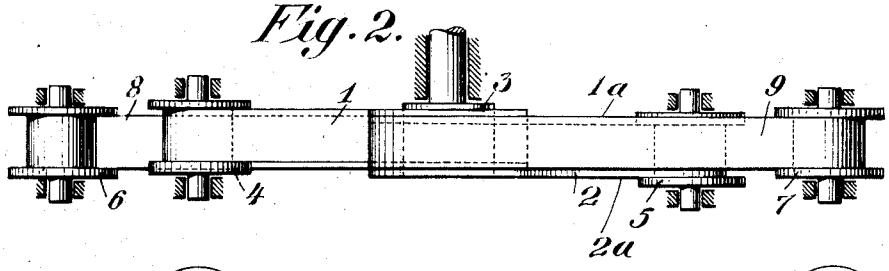


Fig. 1.

Fig. 2.



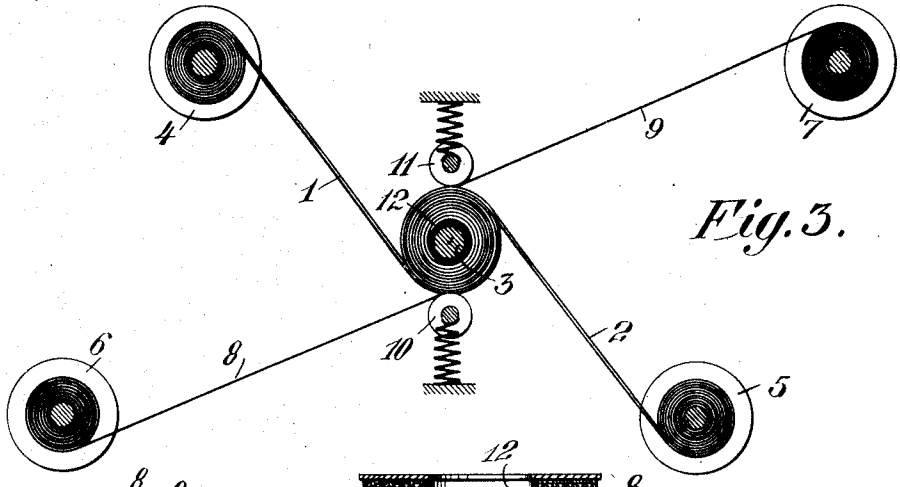


Fig. 3.

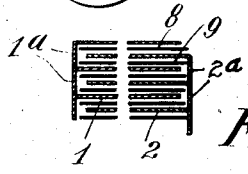


Fig. 5.

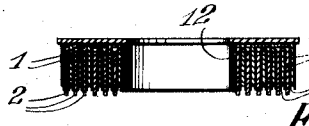


Fig. 4.

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ELECTRICAL CONDENSER AND METHOD OF MAKING IT.

1,385,379. Specification of Letters Patent. Patented July 26, 1921.

Application filed January 26, 1917. Serial No. 144,646.

To all whom it may concern:

Be it known that I, FRANZ KRATZ, a subject of the Emperor of Germany, residing at Stuttgart, Germany, have invented certain new and useful Improvements in Electrical Condensers and Methods of Making Them; and I do hereby declare the following to be a full, clear, and exact description of the invention such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to electrical condensers and methods of making them, and it is a continuation, in part, of my copending application Serial No. 815,478, filed January 30, 1914, now Patent No. 1,221,998, issued April 10, 1917.

Inasmuch as plate condensers are poorly adapted for manufacture by machinery, coil condensers made by winding two bands of conductive material, as metal foil, with insulation between, have been proposed. When the terminals of such condensers are formed by the end portions of the bands of foil, the wires, metal bands or the like, connected to the ends of the bands of foil, may tear off at the place of attachment. Furthermore, the electrical resistance of the bands of foil depends upon the length of the bands, and if the band is ruptured in winding the condenser, only those portions of the bands between the place of rupture and the connecting wires are effective for the purpose.

In accordance with my invention, these disadvantages are obviated, and not only is an improved product obtained, but the methods herein disclosed are nicely applicable for economical manufacture of large quantities of such condensers. In these methods, the two conductive bands are wound in such manner that at least one, and preferably both of them project laterally on the individual sides of the condenser. Preferably the insulation between adjacent bands of foil is in the form of two bands or ribbons of insulating material such as paper, and these insulating bands are wound simultaneously with the conductive bands, the insulating bands being of such width and so laterally displaced as to extend laterally of the overlapped portions of the bands of foil. In this way, the sidewise projecting edge portions of the entire length of one of the bands of foil is exposed on one side of the condenser, while the sidewise projecting edge portion of the other band of foil is exposed on the other side of the condenser. These sidewise projecting edge portions are then turned over to form side terminals for the condenser, and when turned over they provide substantially continuous contact surface capable of effecting intimate contact throughout the entire length of the bands of foil, with a plate or other suitable form of circuit connection. Thus the electrical resistance of the condenser is decreased, the effect of a rupture in either or both bands of foil is of no consequence, and the character of the contact between the terminals of the condenser and the circuit connection is improved.

In some applications, it is desirable that the condenser have an oval shape instead of a round shape. Formerly, the oval shape has been produced by winding the bands on a round or other shaped core and then pressing the wound condenser to the desired shape after the core has been removed. However, this subsequent compression is apt to strain the bands at the places of lesser radius, and attempts have been made to obviate this effect either by loosely winding the coil so as to provide accommodation for the subsequent change of shape, or the condenser has been wound on a core of comparatively large diameter. In both cases the capacity of a condenser of this kind is comparatively small for the volume which it occupies. In accordance with the method disclosed herein for producing coil condensers of oval shape, the bands are wound directly on an oval core and pressure is applied to the condenser as the bands are being wound thereon, the finished condenser being of the desired shape, free from mechanical strain and of large capacity for its volume. In fact, it is preferable to apply pressure to the condenser as the bands are being wound thereon, no matter what the shape of the condenser may be, for this pressure serves to compact and solidify the condenser and thus render it more durable and more capable of resisting centrifugal stresses when associated with a rotating part such as the armature of an ignition current generator.

The accompanying drawings illustrate the

wound condenser herein disclosed, and suitable arrangements for carrying out the methods for winding them. In these drawings Figure 1 shows diagrammatically the arrangement for winding a coil condenser of oval shape; Fig. 2 is a plan view of Fig. 1; Fig. 3 is a similar arrangement in diagrammatic form for winding coil condensers of round shape; Fig. 4 is a cross-section of a wound condenser, with the sidewise projecting band of foil turned over on one side only against the condenser by a terminal plate; and Fig. 5 is an enlarged view, partly broken away, showing the turned over edge portions of the bands of foil.

Figs. 1 and 3 show the method of winding the condenser, in which the coils of two conductive bands of metal foil are insulated from each other by two bands of paper. In both arrangements, the rotatable spindle 3 is surrounded by an insulating sleeve 12 forming the core for the condenser. In Fig. 1 the core 12 is of oval shape, so as to form an oval condenser directly, that is, without subsequent compression or baking, while in Fig. 3 the core 12 is round, so as to produce a round condenser. The spools 4 and 5 carrying the bands of metal foil are arranged on opposite sides of the core 12 with their axes parallel to the axis of the core. The conductive band on spool 4 is slightly offset to one side, while the other conductive band on spool 5 is slightly offset to the other side. The spools 6 and 7 carry the two bands of paper to form the insulating material between the conductive bands and are arranged on opposite sides of the core 12 so as to lie between adjacent coils of the conductive bands. The bands of paper are of lesser width than those of the bands of foil and are arranged to overlap without extending to either outside edge of the foil, as is best shown in Fig. 2. Thus, as the spindle 3 is rotated, there is simultaneously wound on the core 12 a layer of metal foil, for instance, the conductive band 1, a layer of paper, as 8, a layer of the second conductive band 2, and a layer of the second paper band 9. The conductive band 1 projects throughout its entire length on one side of the condenser, while the conductive band 2 projects throughout its entire length on the other side of the condenser, the bands 8 and 9 of insulating material extending on each side slightly beyond the overlapped portions of the conductive bands, thereby providing sidewise projecting portions 1^a and 2^a of foil on the individual sides of the condenser. The pressure rolls 10 and 11 are arranged to compact and solidify the condenser as the bands are being wound on the core, and these pressure rolls are so arranged that they accommodate the condenser of either an oval or a round shape as the bands are wound on the core.

A condenser wound in this way, on either a round or oval core, has the edge portions 1^a and 2^a projecting laterally on opposite sides, and the edge portions project to such an extent that when turned over substantially against the sides of the wound condenser, they form side terminals therefor having substantially continuous contact surfaces, as shown in Fig. 5. The projecting edge portions may be turned over by plates pressed against the sides of the wound condenser, as indicated in Fig. 4, or in any other suitable way. The contact surfaces provide effective connection with the entire length of the bands of foil, when the side plates or other suitable conducting pieces are pressed against the sides of the condenser. In this way a connection is made the entire length of both bands of foil, and besides reducing the electrical resistance of the condenser, the contact surface is increased and the effect of a break at any place in either band of foil is entirely nullified.

Having thus described my invention, what I claim is:

1. The method of making electrical condensers, which consists in simultaneously winding alternate bands of foil and dielectric laterally displaced in such manner that one of the bands of foil projects on one side of the bands of dielectric to form a narrow projecting edge portion, and then pressing the projecting edge portion flat against the side of the condenser to form a side terminal, the narrow projecting edge portion being of such width as to form a substantially continuous contact surface on the side of the condenser when pressed flat thereagainst.

2. The method of making electrical condensers, which consists in simultaneously winding alternate bands of foil and dielectric laterally displaced in such manner that the individual bands of foil project on opposite sides of the bands of dielectric to form narrow projecting edge portions, and then pressing the projecting edge portions flat against the sides of the condenser to form side terminals, the narrow projecting edge portions being of such width as to form substantially continuous contact surfaces on the sides of the condenser when pressed flat thereagainst.

3. The method of making electrical condensers, which consists in simultaneously winding alternate bands of foil and dielectric laterally displaced in such manner that the individual bands of foil project on opposite sides of the bands of dielectric to form narrow projecting edge portions, subjecting the condenser to pressure as the bands are being wound thereon, and pressing the projecting edge portions flat against the sides of the condenser to form side terminals, the narrow projecting edge portions being of such width as to form substantially continuous

contact surfaces on the sides of the condenser when pressed flat thereagainst.

4. The method of making electrical condensers, which consists in simultaneously winding on an oval core alternate bands of foil and dielectric laterally displaced in such manner that the individual bands of foil project on opposite sides of the bands of dielectric to form narrow projecting edge portions, and then pressing the projecting edge portions flat against the sides of the condenser to form side terminals, the narrow projecting edge portions being of such width as to form substantially continuous contact surfaces on the sides of the condenser when pressed flat thereagainst.

5. The method of making electrical condensers, which consists in simultaneously winding on an oval core alternate bands of foil and dielectric laterally displaced in such manner that the individual bands of foil project on opposite sides of the dielectric to form narrow projecting edge portions, subjecting the condenser to pressure as the bands are being wound thereon, and then pressing the projecting edge portions flat against the sides of the condenser to form terminals, the narrow projecting edge portions being of such width as to form substantially continuous contact surfaces on the sides of the condenser when pressed flat thereagainst.

6. An electrical condenser having alternate bands of foil and dielectric, one of the bands of foil having a narrow laterally-projecting edge portion lying substantially flat against the side of the condenser and forming a side terminal therefor, the narrow projecting edge portion being of such width as to form a substantially continuous contact surface on the side of the condenser when pressed flat thereagainst.

7. An electrical condenser having alternate bands of foil and dielectric, the individual bands of the foil having narrow laterally-projecting edge portions lying substantially flat against the opposite sides of the condenser to form side terminals therefor, the narrow projecting edge portions being of such width as to form substantially continuous contact surfaces on the sides of the condenser when pressed flat thereagainst.

8. An electrical condenser having an oval core, and alternate bands of foil and dielectric wound thereon, the individual bands of foil having narrow laterally-projecting edge portions lying substantially flat against the opposite sides of the condenser to form side terminals therefor, the narrow projecting edge portions being of such width as to form substantially continuous contact surfaces on the sides of the condenser when pressed flat thereagainst.

In testimony whereof, I affix my signature.

FRANZ KRATZ.