March 7, 1933. O. BLAKE ET AL 1,900,093

FIXED CONDENSER AND METHOD OF MAKING THE SAME

Filed Dec. 30, 1930

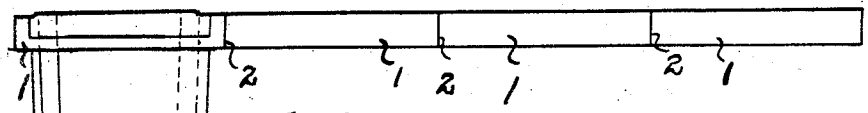


Fig. 1.

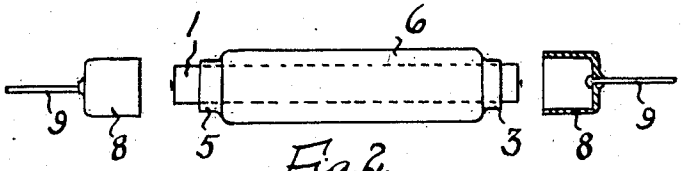


Fig. 2.

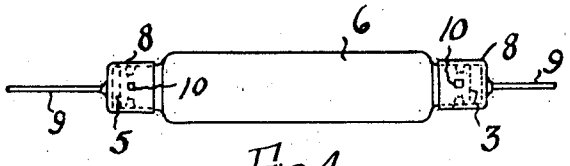


Fig. 4.

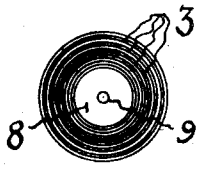


Fig 3

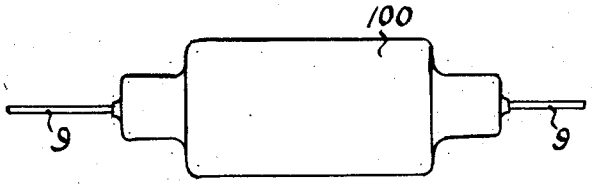


Fig. 5.

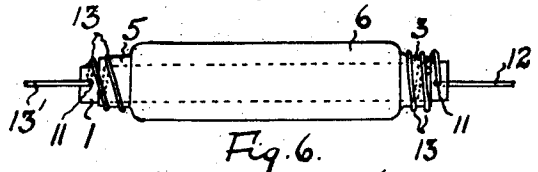


Fig. 6.

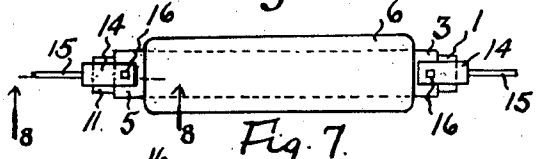


Fig. 7.

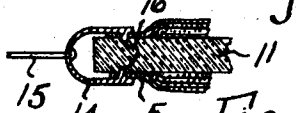
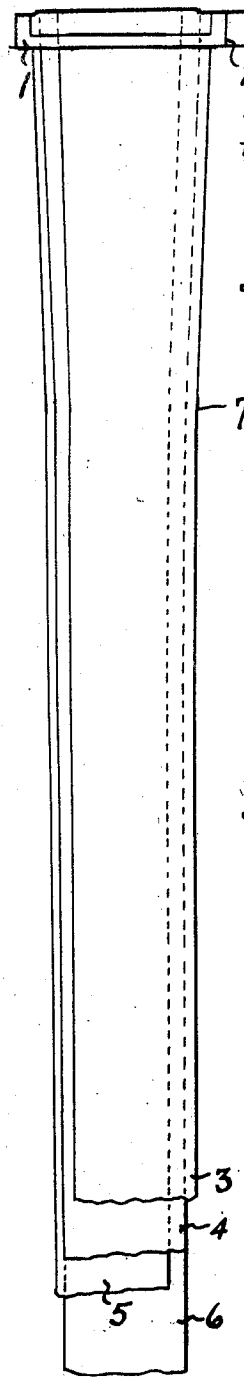


Fig. 8.



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UNITED STATES PATENT OFFICE

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FIXED CONDENSER AND METHOD OF MAKING THE SAME

Application filed December 30, 1930. Serial No. 505,502.

This invention relates in general to small fixed condensers of the wound type but is not necessarily limited thereto.

One of the objects of this invention is the provision of a novel form of fixed non-inductively wound condenser and the method of making the same.

Another object of this invention is to provide a construction and method of making fixed condensers which are adapted to rapid and cheap manufacture because of simplicity of construction.

Another object of this invention involves a wax coated condenser with soft wire supporting leads which are partially enclosed in the wax coating which acts to make a strong and more rugged condenser.

An important object of this invention is the provision of fixed condensers of a type having permanent leads which are constructed so as to provide mounting supports for the condensers.

Another object of this invention is the provision in a self-supporting condenser of this type of a rigid center core for supporting both the electrodes of the condenser and the supporting leads in a manner to prevent strains on the electrodes of the condenser when the leads are deformed.

A further object of this invention is the provision of a wound fixed condenser employing a plurality of longitudinally over-lying strips of metal and insulating material shifted transversely in a manner so that the metal strips project laterally beyond the edges of the insulating strips.

Another object of this invention is to employ overlying strips of this nature which have diverging edges near the end so that the first few turns of the metal strips project beyond the main body of the condenser to permit of connection thereto.

A still further object of this invention is the provision of lead supporting caps which fit over the projecting edges of the metal strips and the central mandrel or core and secured to the core by metal tabs on the caps struck into the core through the metal strips.

Another object of this invention is the provision of a paper dielectric condenser with wire leads which provide the sole support for the condenser.

A still further object of this invention is the provision of a non-inductive condenser having leads which provide the sole support therefor.

These and other objects as will appear from the following disclosure are secured by means of this invention.

This invention resides substantially in the combination, construction, arrangement, relative location of parts, steps and series of steps, all as will be described in greater detail below.

Referring to the drawing,

Figure 1 is a view of the mandrel and the alternate strips of insulating material and metal at the start of the winding operation;

Fig. 2 is a plan view of a condenser wound with the end caps in position to be fixed in place;

Fig. 3 is an end elevational view of a wound condenser with the caps in place showing how the turns of one strip of metal are electrically in contact to make a non-inductive condenser;

Fig. 4 is a plan view of the condenser with the end caps applied;

Fig. 5 is a plan view of a finished impregnated condenser;

Fig. 6 is a plan view of a modified form of condenser not employing end caps;

Fig. 7 is another modified form employing metal clips in place of the end caps;

Fig. 8 is a cross sectional view taken on the line 8—8 of Fig. 7.

It is broadly old to make fixed condensers by winding upon a mandrel strips of metal separated by layers of insulating material which are super-imposed longitudinally and transversely in alignment. Condensers of this type are usually provided with leads which are connected to the metal strips without the provision of means for supporting the leads so that, as they are bent, there is a tendency for the leads to tear the metal strips ruining the condenser.

The condenser of this invention overcomes this major difficulty and, in addition, has

many other features of advantages over prior known constructions.

Referring to the drawing there is shown in Figure 1, a core of mandrel made of suitable insulating material such as fiber, bakelite, impregnated wood and the like. This core, as shown in the form of a round rod, scored at separated points, as indicated at 2, to provide a number of cores 1 of the desired size. The core is mounted in a suitable winding machine so that the first section 1 is exposed for winding. The metal strips 3 and 5 are constructed of any suitable, thin metal, such as tin foil. A strip of thin, insulating material, such as wax paper, is shown at 4 lying between the metal strips 3 and 5. Under-lying the metal strip 5 is a similar strip of insulating paper 6. In accordance with this invention, the paper strips are in alignment. both longitudinally and transversely. The metal strip 3 is shifted transversely with respect to the paper strips so as to extend a short distance there beyond as shown, and, in a similar manner, the other metal strip 5 is shifted transversely in the opposite direction so as to extend a short distance beyond the paper strips.

For a suitable distance from the end of these strips where the winding begins, the strips are wider. As shown in this figure, these strips gradually diverge from the point 7 to the end, while the remainder of the strips is of uniform width. It is of course apparent, that the wider end from the point 7 could be of uniform width and joined to the narrower portion of the strips by a shoulder. It is immaterial how the above result is secured just so long as the first few turns of the metal strips extend farther beyond the main body of the winding than the remaining turns. In other words, although all of the turns of the metal strips project beyond the insulating strips, the first few turns extend a greater distance than the remaining turns.

The mandrel or core is rotated causing the superimposed layers to wind up thereon until the desired amount of material has been wound to provide a condenser of a desired capacity. The strips are then cut off and the first section 1 of the core is broken off at the scoring 2. The core may then be advanced to expose the next section 1 for winding. The condenser is in the state indicated in Fig. 2 when the winding is completed, the layer of paper 6 forming the last turn to insulate the strip 5 from exterior contact. At the left, the first few turns of the metal strip 3 project as shown at 5 and, at the right, the first few turns of the metal strip 3 project as shown at 3. The caps 8 are of metal and are provided with soft drawn, copper wire leads 9 which are soldered thereto. In the form disclosed for illustration, the leads extend through a center hole in the caps and are soldered on the interior wall thereof.

As shown in Fig. 4 the caps are slipped over the ends of the core 1 and over the projecting turns of the metal strips 5 and 3. Four diametrically opposed square punch holes are then made in the cap striking up metal tabs which pass through the projecting ends 5 and 3 of the metal strips and into the core 1. This simple operation serves to secure the caps in place and to effect permanent electrical contact with the metal strips of the condenser without soldering. This is an important feature of the invention since it is well known that it is difficult to secure the leads of a condenser to the metal strips by soldering or indeed by any present known method. In addition, the relatively stiff leads quickly tear the thin metal strips ruining the condenser. A very important feature of this invention is now apparent. Soft drawn copper leads 9 soldered to the caps, may be bent to any suitable shape without placing any strain on the plates of the condenser since the core directly takes these strains. For this reason, the leads 9 may be employed as the sole support for the condenser. Another feature of this invention is apparent from Fig. 3. As the condenser builds up during the winding operation, the projecting edges or the metal strips form into substantially, concentric cylinders. When the winding of the condenser is finished, these projecting edges may be bent downwardly so that all the layers of each strip are forced into electrical contact; the innermost turns contacting with the projecting edges 3 and 5. The result is, that all the turns of each plate of the condenser are in electrical contact producing a non-inductive fixed condenser. In the case of the small condensers, all the plate turns are included under the end caps to insure interconnection between the plates. In the case of the larger condensers only a few of the turns of each plate are included under the caps, and the remaining turns are folded down over each other in succession as indicated in Fig. 3.

The unit of Fig. 5 is then immersed in a suitable, insulating compound so that it is completely encased thereby, as indicated at 100 in Fig. 5. As a result moisture cannot get into the condenser to reduce its dielectric resistance and change its capacity.

In the modified arrangement shown in Fig. 6, the condenser is wound to the point indicated in Fig. 2 in the same manner as already described. In this form metal caps are not employed. The ends of the core 1 are provided with holes 11 through which the ends of the leads 12 and 13 extend. The inner ends of these leads are wound around the projecting edges 3 and 5 of the metal strips to form the turns 13. This provides a contact between the leads 12 and 13 and the

metal plates. The entire condenser is coated with an insulating compound as described before. The insulating coating which may be of wax thoroughly protects the condenser and also acts to strengthen the wire leads. It will be noted that, as in the case of the first form described, the core 1 takes all the strains when leads 12 and 13 are bent. The modified arrangement in Figs. 7 and 8, likewise comprise the wound member as shown in Fig. 2. In this case, instead of employing caps, U-shaped clips 14 are provided which support the leads 15. These caps slip over the end of the core 11 which, in this case, is rectangular in form and are secured thereto by punched out tabs as indicated at 16. These tabs extend as before through the projecting edges of the metal strips 3 and 5 into the core 11. Here, likewise, the strains are taken by the core. This condenser is also coated with a suitable impregnating compound.

It is pointed out that although the invention is not limited thereto, the punch holes 10 and 16 are square so as to provide four tabs lying on the sides of a square which insure that the caps and clips are securely fastened to the core. The arrangement permits the core to take strains in all directions without loosening the caps or clips.

It is apparent from the foregoing description that we have provided a fixed non-inductive condenser which is relatively simple to manufacture and adapted to rapid and cheap production without, in any way, sacrificing the quality thereof. Indeed by this construction, a very desirable and strong condenser results. The leads from the condenser are secured thereto to provide a support for the condenser and may be deformed without exerting any strains on the thin metal strips which comprise the condenser. The member which is shown as a core need not necessarily be a central core since the advantages of this construction can be secured without having the member 1 at the center of the condenser.

Since then this invention resides in certain principles of construction and methods of procedure, it is not desired to be limited to the disclosure as given for purposes of illustration but rather to the scope of the invention as it is defined in the appended claims.

What we seek to secure by United States Letters Patent is:

1. A fixed condenser of the type described comprising a core, two metal strips mounted on said core and insulated from each other, the edge of one strip being exposed at one end of the core and the edge of the other strip being exposed at the other end of the core, said core having a transverse hole near each end and leads extending through said holes and in contact with the exposed edge of each strip respectively.

2. A condenser comprising a pair of conducting foils and a pair of insulating strips interleaved with the conductor strips to insulate them from each other, a supporting member therefor, the foils projecting beyond the edges of the insulating strips, wire leads coiled at the ends, the coils being conductively connected to the foils, and means for securing the leads to said supporting member.

In testimony whereof we have hereunto set our hands on this 13th day of Dec. A. D., 1930.

OCTAVE BLAKE.
HAIM BEYER.