W. E. KRONE.

MULTICONDUCTING LEADS.

APPLICATION FILED JUNE 16, 1919.

1,337,080. **Patented Apr. 13, 1920.**

Fig. 1.

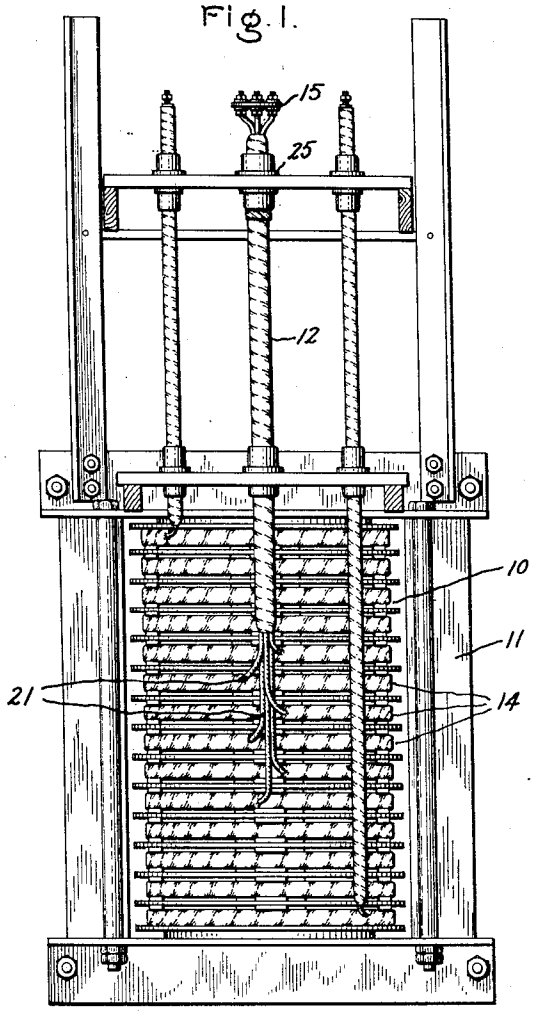


Fig. 2.

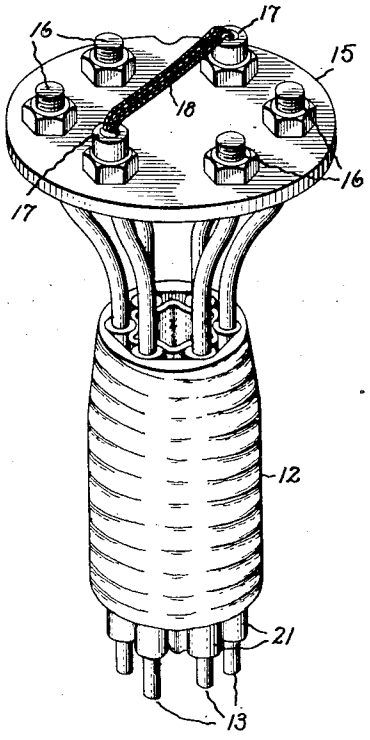


Fig. 3.

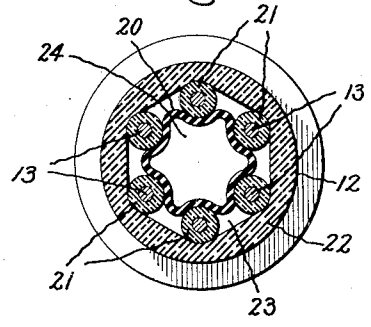
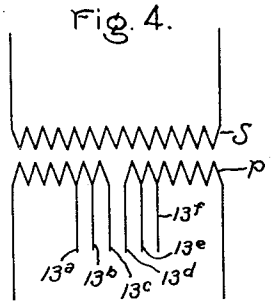


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MULTICONDUCTING LEADS.

1,337,080. Specification of Letters Patent. Patented Apr. 13, 1920.

Application filed June 16, 1919. Serial No. 304,618.

To all whom it may concern:

Be it known that I, WARD E. KRONE, a citizen of the United States, residing at Pittsfield, county of Berkshire, State of Massachusetts, have invented certain new and useful Improvements in Multiconducting Leads, of which the following is a specification.

My invention relates to conducting leads for electrical apparatus and has for its object the provision of a simple, durable and economical construction therefor.

More specifically my invention relates to leads adapted to bring a number of conductors out from electrical windings supplied with alternating current, and is designed to produce a construction which is durable and operates with small power losses in the dielectric insulating material employed in its manufacture.

In leads, such as are familiarly known as "multiconductor leads" to the electrical trade, it has been customary to group the various conductors about a solid core of some suitable insulating material and then bind the leads thereto by further external wrappings or layers of insulating material. When the voltages are relatively high, still greater amounts of insulation are customarily added. Accordingly it is seen that as the voltage increases with its attendant increase in energy losses in the insulating material, the greater will become the difficulty in properly dissipating the heat generated in connection with such losses, since the added dielectric material has also added to the heat insulation.

In the practice of my invention I have arranged the various conductors inside of an insulating jacket and have provided for the free circulation of a cooling and ventilating medium therein. In this way the heat generated by the losses is taken away by convection; the heat thus being quickly dissipated without having materially decreased the amount of insulating material employed.

For a more complete understanding of the nature and objects of my invention reference should be had to the following detailed description taken in connection with the accompanying drawing in which:

Figure 1 is a view in side elevation of my invention as applied to a transformer. Fig. 2 is a fragmentary perspective view showing details of my invention. Fig. 3 is a cross section of the lead construction shown in Fig. 2. And Fig. 4 is an explanatory diagram.

Referring now to the drawing, 10 represents the winding of a transformer carried on the central leg of the core 11. The lead 12 is here shown as used to bring out to a convenient point the terminal connections 13 of the central coils 14 of the winding 10.

The terminal connections 13 are here shown as six insulated conductors led up to the terminal board 15 which is placed so as to be near the surface of the oil or other insulating medium in which the winding 10 is designed to be submerged. The board 15 is of sufficient size so that the six conducting posts 16, in which the conductors terminate, will be safely insulated apart. The posts 16 are here shown as threaded in order to receive a cap 17 designed to retain in conducting relation with the posts the conducting member 18, which is employed to make the desired connections between the coils 14, but obviously any convenient means may be employed to this end.

I employ my improved lead construction in order to bring these conductors from the coils 14 to the terminal board 15 properly insulated from the windings 10 but yet so arranged as to afford the necessary dissipation of the heat generated.

To this end the conductors or connections 13 are laid in the corrugations of a corrugated insulating cylinder 20. The conductors proper of the connections 13 preferably have a sufficient insulating covering, shown at 21 in Fig. 3, to insulate them from each other, but such thickness is not essential by reason of the intervening space 23 between them.

The conductors 13 are secured in these corrugations and to the cylinder 20 by means of the external insulating wrappings or layers, which form thereabout the insulating jacket 22. This jacket is made of sufficient thickness to provide the proper dielectric strength to resist puncture from the conductors 13 to ground or to the windings 10. This jacket 22 passes tangentially about the conductors 13 so that spaces exist between the conductors 13, the jacket 22 and the cylinder 20, as indicated at 23. These spaces together with the central duct 24 in the cylinder 20, comprise passages through

which the oil or other insulating fluid, in which windings 10 are submerged, will freely circulate to carry off the heat engendered by the dielectric hysteresis losses, since this jacket is held in upright position by means of the support 25, has both ends open, and is submerged in such insulating fluid.

Where my invention is applied to bring out the tap leads from an electrical winding, as for instance from the transformer winding P—S shown in Fig. 4, taps being provided to vary the voltage, such as shown at 13^a, 13^b, 13^c, 13^d, 13^e, and 13^f, the connections from these taps would be housed in an insulating jacket such as I have described and led to a terminal board where a conducting member is employed to connect one of the taps 13^a, 13^b or 13^c with one of the taps 13^d, 13^e or 13^f.

Having now described what is at present the best means known to me for carrying out an embodiment of my invention, I would have it understood that such means are merely illustrative and that I do not mean to be limited thereby to the exact details shown nor in the choice of recognized equivalents except as defined in my claims hereunto appended.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. The combination with an electrical winding having tap connections, of a terminal board to which said connections are led, and an insulating jacket enveloping said connections in the region of said windings, said jacket being formed with ventilating ducts between and about said connections.

2. The combination with an electrical winding having tap connections, of a terminal board to which said connections are led, a hollow insulating cylinder on which said connections are laid, and an insulating jacket enveloping said connections in the region of said cylinder.

3. The combination with an electrical winding having tap connections, of a terminal board to which said connections are led, a hollow corrugated cylinder in the corrugations of which said connections are laid, and an insulating jacket binding said connections in said corrugations and enveloping them in the region of said cylinder.

4. A lead structure comprising a hollow insulating cylinder, conductors laid along said cylinder, and a wrapping of insulating material laid tangentially across said conductors to bind them to said insulating cylinder.

5. A lead structure comprising a hollow corrugated insulating cylinder, conductors laid in the corrugations of said cylinder, and a thick wrapping of insulating material laid tangentially across said conductors to bind them in said corrugations and to form ventilating passages between and about them.

In witness whereof I have hereunto set my hand this 12th day of June, 1919.

WARD E. KRONE.