April 7, 1925. 1,532,846

C. H. THORDARSON

ELECTRICAL CONDENSER

Filed March 31, 1920

Fig. 1

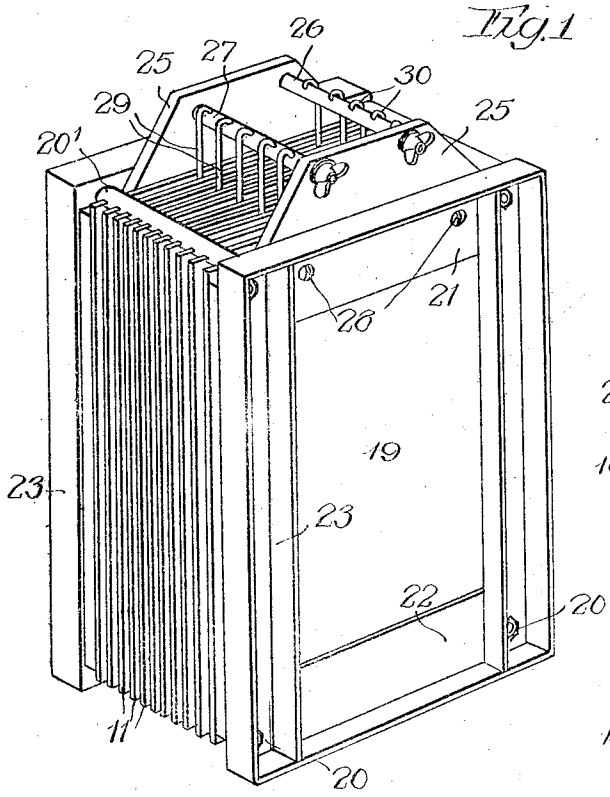


Fig. 2

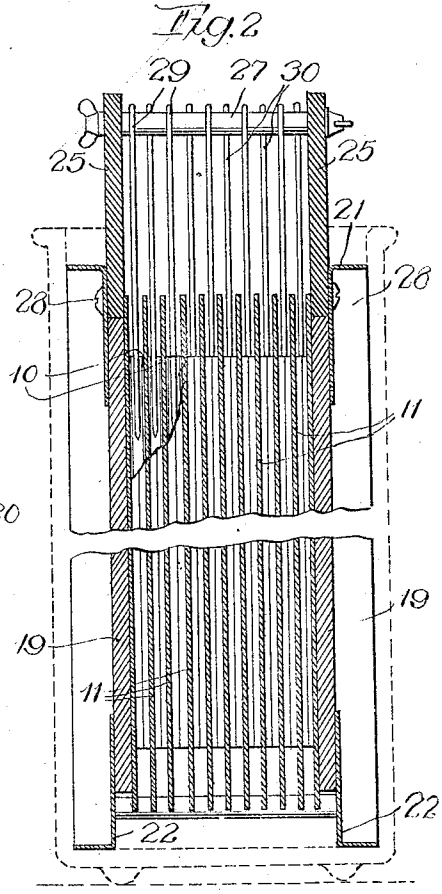
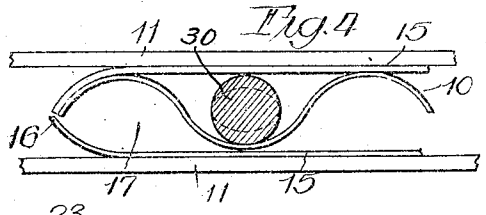


Fig. 4



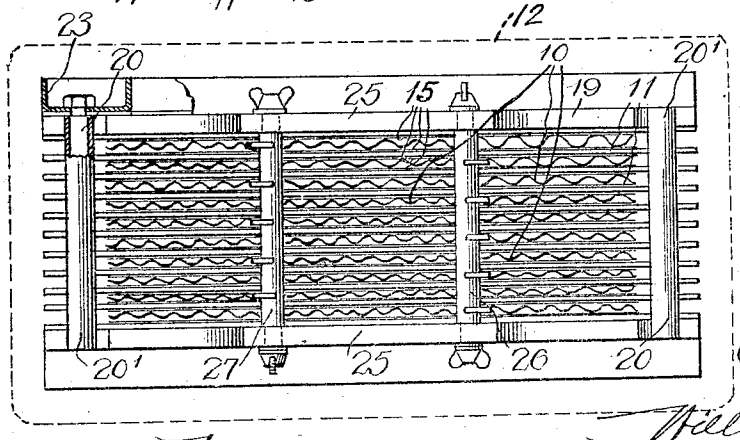


Fig. 3

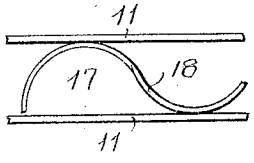


Fig. 5

Inventor.

Chester H. Thordarson

By William L. Hall

Atty.

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UNITED STATES PATENT OFFICE.

CHESTER H. THORDARSON, OF CHICAGO, ILLINOIS.

ELECTRICAL CONDENSER.

Application filed March 31, 1920. Serial No. 370,061.

To all whom it may concern:

Be it known that I, CHESTER H. THORDARSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electrical Condensers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in electrical condensers designed more particularly for high tension currents of that type that is constructed and adapted to be cooled by immersing the same in a body of cooling oil or like cooling medium.

Among the objects of the invention is to provide a novel form of compound conducting and spacer elements between the dielectric elements so constructed and arranged that thereby the conducting and dielectric elements may be kept cool by the flow of a cooling medium over and about the surfaces thereof, the conducting elements being such as to provide for a large and free distribution of the cooling medium over or in contact with the surfaces thereof.

Another object of the invention is to provide a construction of the spacing and conducting elements by which the condenser structure as a whole is resiliently braced against deformation under mechanical stresses, and whereby the dielectric elements are protected against rupture by electrostatic stresses.

Other objects of the invention are to otherwise improve and simplify the condenser structure, and the invention consists of the combination and arrangement of the parts shown in the drawings and described in the specification, and is pointed out in the appended claims.

In the drawings:

Figure 1 is a perspective view of an electrical condenser embodying my invention.

Figure 2 is a vertical section thereof showing the outline of the casing to hold the oil in which the condenser structure is adapted to be submerged.

Figure 3 is a top plan view of the condenser, with parts broken away.

Figure 4 is an enlarged detail showing one of the conducting elements of the condenser.

Figure 5 is a detail view showing a modification of the conducting element.

As shown in the drawings, 10 and 15 designate respectively the spacing and conducting elements of the condenser, and 11—11 designate the dielectric elements interposed therebetween. The condenser as a whole is contained in a casing 12, shown in dotted outline in Figures 2 and 3, the casing being of such form and dimensions as to closely receive the condenser and to contain a sufficient body of cooling medium for cooling the condenser.

The dielectric elements 11 consist, as herein shown of plain or flat sheets and may be made of any suitable insulating material, such as mica, fibre, or the like, and are of sufficiently greater vertical length and transverse width than the spacing and conducting elements as to project at both ends and at the sides beyond said latter elements to avoid leakage around the edges of the dielectric elements.

The conducting elements are characterized in part by the flat sheets 15 that lie against the flat faces of the dielectrics and in part by the sheets 10 of longitudinally corrugated or wavy cross section so arranged as to form at the sides thereof throughout the length of the sheets up and down passages for the flow of a cooling medium, as oil.

The outer curves of the intermediate corrugated elements contact with the flat inner faces of the exterior elements 15. The said flat plates or elements may be curved at their side edges toward each other as shown at 16 (Figure 4) so that the compound spacing and conducting elements comprise an elongated tube open at top and bottom, of which the sheets or elements 15—15 are the side walls and the intermediate elements 10 between them, in the wave-like or corrugated structure are bracing elements. In this arrangement there are formed between the intermediate and outer elements unobstructed vertical channels 17—17 through which the cooling medium can flow for contact with the faces of all of the elements.

In the construction shown in Figure 5, a

single sinuous wave-like element 18 is arranged between adjacent pairs of dielectric elements to form the oil passages 17 between the single conductor element and the adjacent dielectric elements.

The said condenser structure is bound together between flat sheet insulating elements 19—19 that may be made of wood, fibre, or the like; and tie-bolts 20—20 extend transversely through the said elements 19 above and below the conducting elements of the condenser and tie said parts together. The confining frame thus constructed may include also upper and lower transverse angle bars 21, 22 which lie along the outer faces of the insulating elements 19 near their upper and lower ends, and side channel bars 23 which lie outside of and over the vertical webs of the angle bars, terminating in abutting relation to the lateral flange of the angle bars. The tie bolts 20 extend through said angle and channel bars, with their heads and nuts bearing on the webs of the channel bars so as to thereby clamp the elements of the assembled structure in fixed relation to each other against mechanical stresses. The said tie bolts are surrounded by or extend through insulating sleeves 20′ which are partially contained in parti-cylindric or other shaped notches in the upper and lower edges of the dielectric elements so as to constitute means for holding said dielectric elements both from vertical and lateral shifting. The flanges of the angle and channel members 22, 23 are of such dimensions as to closely fit in the casing 12 to hold the condenser structure firmly therein and to avoid vibration of the condenser structure.

25—25 designate insulating mounting plates for terminal rods 26 and 27 of the conducting elements of opposite polarity. The said mounting plates 25 are in vertical alignment with the confining insulating plates or members 19 and are attached to the frame structure by screws 28 that pass through the angle bars above referred to. The said terminal rods extend between, and through openings in, the mounting plates, and are threaded at their ends outside of their mounting plates 25 to constitute at their ends binding posts for the circuit wires. Each of said terminal rods 26—27 is connected to alternate conducting elements by means of conducting hooks 29—30, which hooks fit over said rods and engage openings therein in the manner shown in Figure 1, and the shanks of said hooks are flattened, and as indicated in dotted lines in Figure 4, so as to enter the conduits 17 for oil flow and are thereby in contact with said conducting and spacing elements. Thus it will be seen that the terminal rods 26, 27 are connected through said hooks 29, 30 to alternate conducting elements of the condenser structure. The conducting hooks, connected as they are to said conducting elements and the terminal rods, enable said hooks to be readily removed and replaced so as to thereby vary the active capacity of the condenser.

With the construction described it will be observed that the conducting and spacing elements are so related to the dielectric elements that there is formed ample passage way for the cooling medium for contact with the full faces of the conducting and spacing elements and dielectric elements, whereby the condenser structure may be kept suitably cooled. While capable of large and varied capacities, it will be furthermore noted that the construction is such that the dielectric and conducting elements are mutually pressed together so as to produce a very rigid structure and avoid buckling thereof under heavy electrical stresses. It will also be observed that the construction and arrangement of the compound conducting and spacing elements shown is such as to greatly increase the capacity of the condenser to adapt it to high tension currents.

I claim as my invention:

1. An electrical condenser comprising interleaved dielectric and conducting elements, the conducting elements being formed of tube-like structures having side members for contact with the dielectric elements and with intermediate curved members.

2. An electrical condenser comprising interleaved dielectric and compound conducting elements, the conducting elements embracing wave-like transverse formations to provide at the sides thereof passages for a cooling liquid, and flat members between said formations and the dielectric elements.

3. An electrical condenser comprising interleaved dielectric and conducting and spacing elements including sheets that lie against said dielectric elements and vertically corrugated elements between and lying with their convex faces against said sheets, the side margins of said sheets being curved towards each other.

4. An electrical condenser comprising interleaved dielectric and conducting elements, the conducting elements being of wave-like transverse formation to provide at the sides thereof passages for a cooling liquid, said dielectric elements extending transversely and longitudinally beyond the margins of the conducting elements, means for tying the structure together, combined with means to interlock with the dielectric elements to hold them from movement in their planes.

5. An electrical condenser comprising interleaved dielectric and conducting elements, the conducting elements being vertically corrugated to provide at the sides

thereof passages for a cooling liquid, terminal rods supported on said structure and hooks engaging said rods and adapted to extend at their ends into said cooling medium passages for contact with said conducting elements.

6. An electrical condenser comprising interleaved dielectric and conducting elements, the conducting elements being of wave-like transverse formation to provide at the sides thereof passages for a cooling liquid, insulating plates at the end of the structure and attached thereto, terminal rods extending between and supported on said insulating plates, and hooks engaging said rods and extending at their ends into said passages for contact with said conducting elements.

7. In an electrical condenser a conducting, spacing and cooling channel unit including conducting sheets adapted to lie against opposed dielectric elements and corrugated sheets between and lying with their convex surfaces against said sheets.

In witness whereof I claim the foregoing as my invention, I hereunto append my signature this 18th day of March, 1920.

CHESTER H. THORDARSON.