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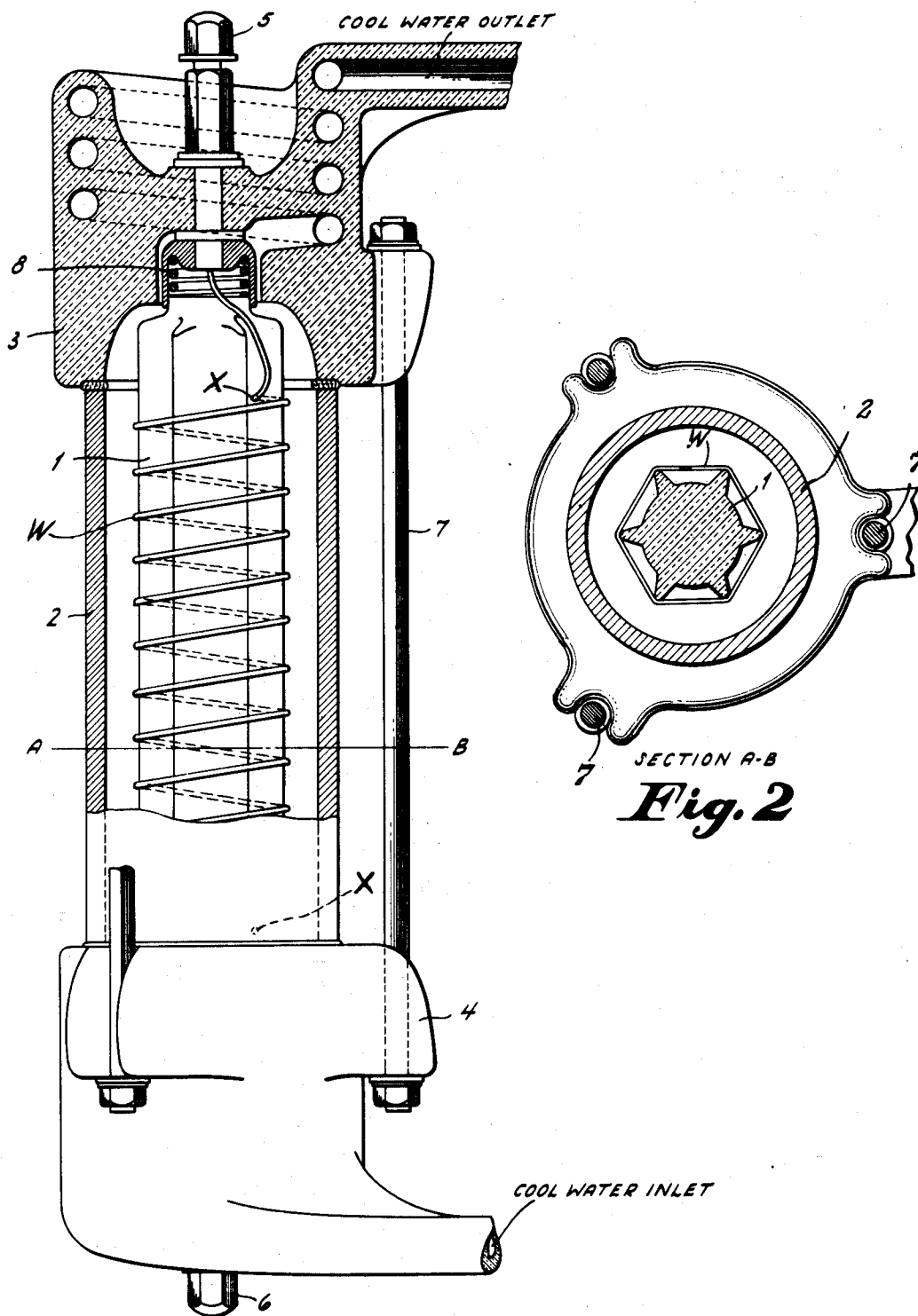


Fig. 1

SECTION A-B
Fig. 2

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FLUID-COOLED RESISTANCE

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8 Claims. (Cl. 201—65)

The necessity of cooling resistances of the kind used particularly in large-power radio frequency transmitter stations has led to the construction of various forms of resistances cooled by liquid or fluid. For instance, liquid-cooled resistances have been disclosed in the prior art which consist of a tubular insulator presenting a solid surface upon which the resistor wire is wrapped in the shape of a simple spiral or helix, either bifilar-fashion or crossed. In this form of construction, the resistance wire throughout its whole length is in direct contact with the insulator tube. Another tubular insulation body surrounds the resistance. The supporting insulator is united with this last-mentioned insulator shell at the end by means of metallic members, mostly similar head pieces so as to result in a sealed unit.

For electrical reasons, the cooling fluid or refrigerant, at points directly ahead of and behind the resistance to be cooled must be conducted through relatively long insulation pipes so as to keep off radio frequency or the high potential. It will be readily understood that such portions of insulation which must be of a length of one meter and over, looked from a constructional viewpoint, are quite inconvenient because of the space which they require. Another fact is that a direct contact between the resistor wire and the supporting insulator which in the past has been the exclusive practice in the case of fluid-cooled resistances, is unfavorable from the viewpoint of intense cooling of the resistor.

According to the invention, a liquid-cooled resistance, especially for radio frequency transmitters, which consists of a supporting member for the resistance and an insulation pipe tubularly surrounding and enveloping the former, is constructed in such a way that the resistance support or form and the insulation pipe are interconnected at the ends by insulation headers, the latter closing the space required for the liquid between the two and comprising a long insulating duct or path for the inlet and the outlet of the liquid.

The invention shall now be described in more detail by reference to the appended drawing. Fig. 1 shows an elevation of a fluid-cooled resistance according to the invention partly in section, and Fig. 2 is a cross-section thereof. Referring to the drawing, 1 is a winding form or support which is here shown with a resistance winding W. The start and finish of the winding W is anchored by having a small aperture X located in one of the ribs of support 1. 2 is the

sheath or shell surrounding the winding form, together with the resistor wire, the said shell or envelope constituting the outer duct wall for the refrigerant. 3 and 4 are the insulation headers which as far as feasible should be similar and which shut the space between the winding form or support 1 and the shell 2 both on top and below. In these fitting parts or headers of insulation material, in the exemplified embodiment here shown, a duct for the fluid of sufficient length and being in the form of a helix is provided for circulation of the cooling fluid. This insures adequate insulation length which is required to keep radio frequency or high potential or both away from the refrigerant inlet and outlet. The current-supply terminals 5 and 6 are fitted into the insulation headers by methods known in the art so that perfect tightness for liquid is insured. Both insulation headers are locked together by means of tension or stay bolts 7 disposed outside the shell, and this assures a perfectly safe and tight seat of the insulation fittings upon the outer shell. In order to prevent cracking of the winding form or support by heat, the latter is fitted yielding into the insulation body 3 by the use of a coil spring 8, while yet a perfect seal against the ambient air is insured.

The use of an inlet and an outlet for the refrigerant in the wound helical shape inside the insulation header offers the great advantage that in this way a large length of effective cooling path or duct is accommodated within a minimum space for insulation and additional throttling action.

A resistance as here disclosed is adapted to be secured readily without accessory insulators on metallic structures, frames, etc., for instance, by fitting clips on the insulation headers. What is also essential in the invention is the particular form, say, star-form, of the winding support or form. This form has never been used in the past for water-cooled resistances. It will be understood that this form or a similar or equivalent form insures an all-around contact between the resistor wire and the refrigerant, and this affords a far more intense and efficient cooling than in the fluid-cooled resistors heretofore used and disclosed in the art.

What is claimed is:

1. A fluid cooled resistance device for radio frequency use comprising a winding of resistance wire, a central core for supporting said resistance wire, an outer metallic shell surrounding said resistance wire, two insulating blocks for

supporting said core and resistance wire, each one of said blocks having a multi-turn helical fluid duct therethrough the length of which is sufficiently long to insure adequate insulation to keep the radio frequency potential away from the outside ends of said fluid duct, the inside end of said fluid duct located at an end of said core, means for connecting the fluid duct of each insulating block with a source of cooling fluid whereby said fluid passes over and comes in direct contact with said resistance wire, and terminal means passing through each one of said blocks and connected to said resistance wire.

2. A fluid cooled resistance device for radio frequency use comprising a winding of resistance wire, a central core having a star-shaped cross-section for supporting said resistance wire, an outer metallic shell surrounding said resistance wire, two insulating blocks for supporting said core and resistance wire, each one of said blocks having a multi-turn helical fluid duct therethrough the length of which is sufficiently long to insure adequate insulation to keep the radio frequency potential away from the outside ends of said fluid duct, the inside end of said fluid duct located at an end of said core, means for connecting the fluid duct of each insulating block with a source of cooling fluid whereby said fluid passes over and comes in direct contact with said resistance wire, and terminal means passing through each one of said blocks and connected to said resistance wire.

3. A fluid cooled resistance device for radio frequency use comprising an insulating core having a plurality of radially spaced longitudinal ridges, a resistance unit located upon the ridges of said insulating core, an outer shell surrounding said core and resistance unit, two insulating blocks for supporting said core, each one of said blocks having a fluid duct therethrough and located at an end of said shell for enclosing said resistance unit, and means for connecting the fluid duct of each insulating block with a source of cooling fluid whereby said fluid passes around the ridges of said core and comes in direct contact with said resistance unit.

4. A fluid cooled resistance device for radio frequency use comprising an insulating core having a plurality of radially spaced longitudinal ridges, a resistance wire wound upon the ridges of said insulating core, an outer shell surrounding said core and resistance wire, two insulating blocks for supporting said core, each one of said blocks having a fluid duct therethrough and located at an end of said shell for enclosing said resistance wire, and means for connecting the fluid duct of each insulating block with a source of cooling fluid whereby said fluid passes around the ridges of said core and comes in direct contact with said resistance wire.

5. A fluid cooled resistance device for radio

frequency use comprising an insulating core having a plurality of radially spaced longitudinal ridges, a resistance wire wound upon the ridges of said insulating core, an outer shell surrounding said core and resistance wire, two insulating blocks for supporting said core, each one of said blocks having a fluid duct therethrough and located at an end of said shell for enclosing said resistance wire, means for connecting the fluid duct of each insulating block with a source of cooling fluid whereby said fluid passes around the ridges of said core and comes in direct contact with said resistance wire, and terminal means passing through each one of said blocks and connected to said resistance wire.

6. A fluid cooled resistance device for radio frequency use comprising a resistance unit, a central core having a plurality of radially spaced longitudinal ridges, an outer metallic shell surrounding said resistance unit, two insulating blocks for supporting said central core, each one of said blocks having a helical fluid duct therethrough, each one of said insulating blocks located at an end of said metallic shell for enclosing said resistance unit, a coil spring member interposed between an end of said core and at least one of said insulating blocks, and means for connecting the fluid duct of each insulating block with a source of cooling fluid whereby said fluid passes around the ridges in said core and comes in direct contact with said resistance unit.

7. A fluid cooled resistance device comprising a resistance unit, an outer shell surrounding said resistance unit, two insulating blocks supporting said resistance unit, each one of said blocks having a fluid duct therethrough and located at an end of said shell to cooperate therewith for enclosing said resistance unit, means for connecting the fluid duct of each insulating block with a source of cooling supply whereby said fluid passes over and comes in direct contact with said resistance unit, and means to bind said insulating blocks and shell together to form a unitary structure.

8. A fluid cooled resistance device comprising a winding of resistance wire, a central core for supporting said resistance wire, an outer shell surrounding said resistance wire, two insulating blocks each one of which is located at an end of said core for supporting it within said shell, each one of said blocks having a fluid duct therethrough and located at an end of said shell to cooperate therewith for enclosing said resistance wire, means for connecting the fluid duct of each insulating block with a source of fluid cooling supply whereby said fluid passes over and comes in direct contact with said resistance wire, and means to bind said insulating blocks and shell together to form a unitary structure.

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