

June 21, 1938.

W. E. BAHLS

2,121,579

WATER JACKET

Filed April 7, 1937

2 Sheets-Sheet 1

Fig. 1.

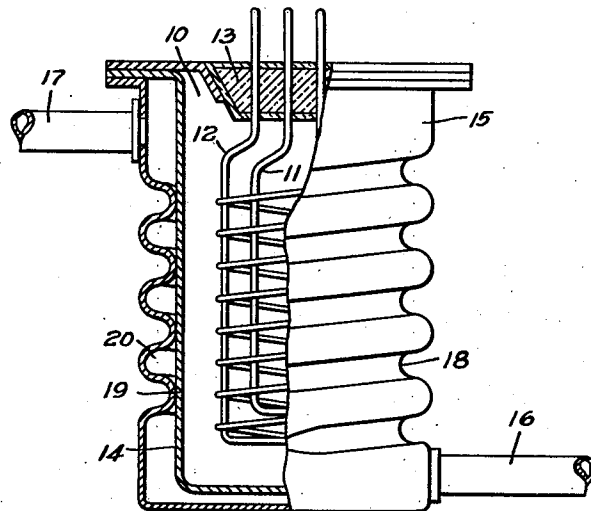
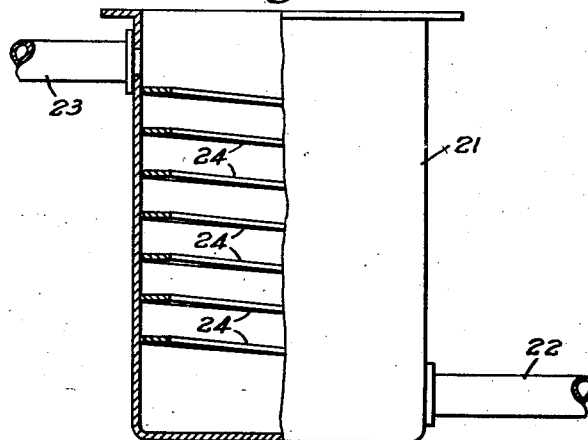


Fig. 2.



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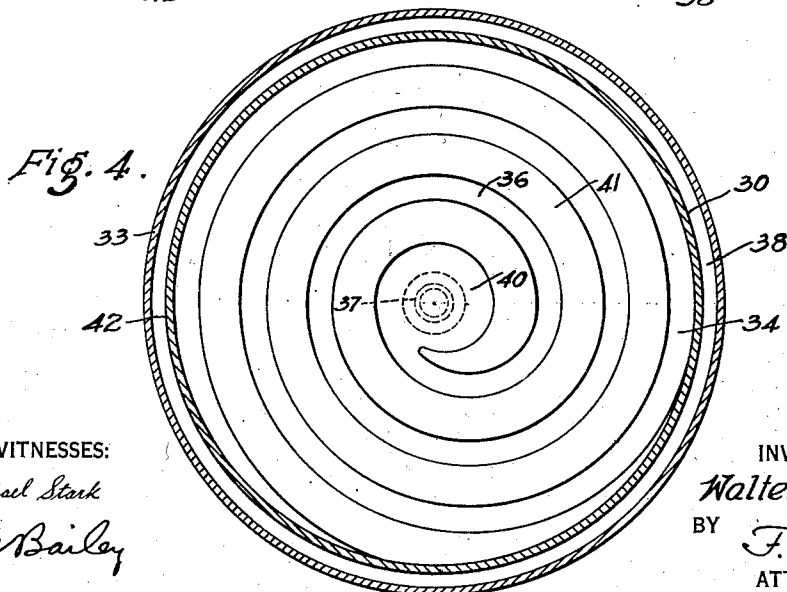
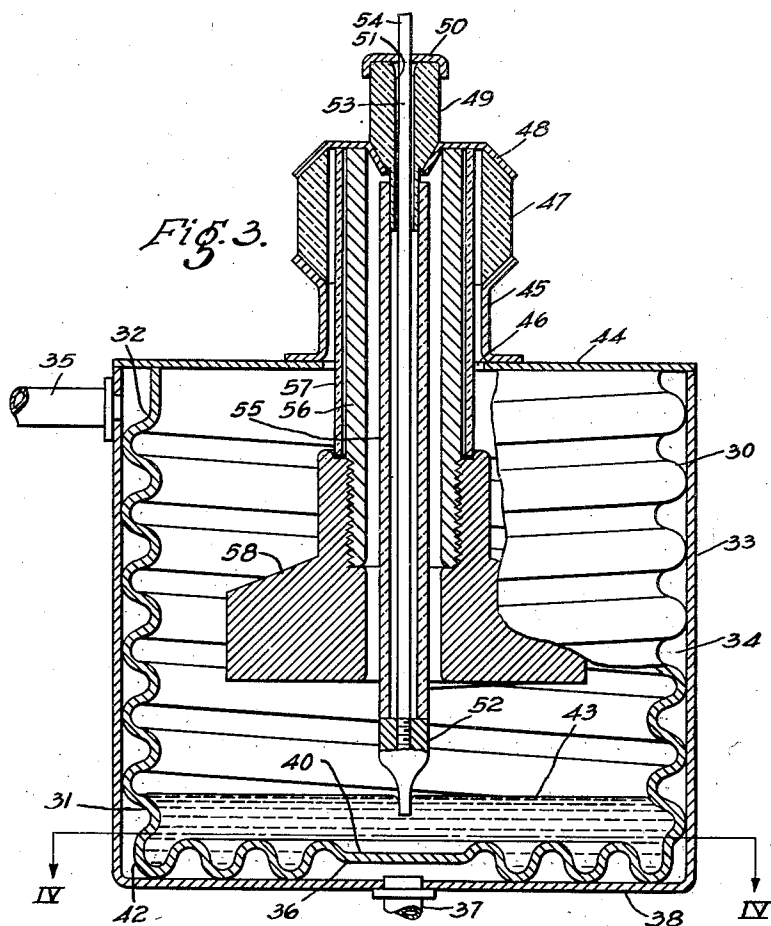
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2 Sheets-Sheet 2



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2,121,579

WATER JACKET

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Application April 7, 1937, Serial No. 135,487

2 Claims. (Cl. 250—27.5)

My invention relates to water jackets and especially to water jackets for discharge devices.

An object of my invention is to provide a simple water jacket for discharge devices that will cause a very rapid flow of water over an exterior surface of the discharge device.

Other objects and advantages of my invention will be apparent from the following description taken in conjunction with the drawings, in which:

Fig. 1 is a view, partly in elevation and partly in cross-section, of a discharge device and its enclosing water jacket,

Fig. 2 is a view, partly in elevation and partly in cross-section, of a modification of the water jacket in Fig. 1,

Fig. 3 is a view partly in elevation and partly in cross-section of a modification of the invention, and

Fig. 4 is a sectional view taken on line IV—IV of Fig. 3.

In discharge devices, the amount of heat which can be removed per unit surface area of the apparatus is dependent upon the velocity of the water flowing past the surface. I desire a simple means of increasing the velocity of flow of water in a jacket, whereby the velocity of the water for a given volume thereof is increased and accordingly the discharge device is more effectively cooled.

One embodiment of my invention is disclosed in Fig. 1, which illustrates a discharge device 10 having an interior cathode 11 and one or more auxiliary electrodes such as the control grid 12 sealed through the insulating portion 13 of the discharge casing. The casing has the metal wall portion 14 forming an anode of the exterior type. My invention particularly concerns the jacket to provide a cooling medium such as water to remove excessive heat from the anode 14. This water jacket comprises a metal member 15 by which the discharge device is adapted to be enclosed. This metal member is in the general shape of a closed end tube with an inlet 16 preferably at the lower portion thereof and the outlet 17 at the upper portion thereof.

The sides of the casing 15 having a helical corrugation 18 therein providing a helical path starting from the bottom portion and extending around and upward to terminate adjacent the outlet 17.

The depth of these corrugations are such that at the bottom of the corrugations the inner wall touches or almost touches the exterior anode as shown at 19. These corrugations, in combination

with the discharge device, provide a somewhat tubular path 20 extending from the bottom portion of the water jacket up to the top of the water jacket adjacent the outlet 17. It will be noted, however, that the path of the cooling medium around the device has its greater cross-sectional area at the surface of the exterior anode 14 and this cross-sectional area decreases towards the outer portion of the casing 15.

While I have disclosed the inlet 16 on the right-hand side of the bottom portion of the jacket, yet the inlet can be located in the center of the bottom if desired. The water enters the inlet 16 and passes through the helical path to the outlet 17. The flow of water is very rapid in respect to its volume due to the long path it must travel around the tube to the outlet. The exterior anode is accordingly very effectively cooled.

In Fig. 2, is disclosed a modification of the water jacket. For the sake of clearness, the discharge device is not illustrated in Fig. 2. The water jacket comprises a metal member 21 in the form of a closed end tube with an inlet 22 and an outlet 23 for the cooling medium. On the interior of the tube is a helical fin 24 starting adjacent the inlet 22 and extending helically upward to adjacent the outlet 23. This fin has a width so that it will just touch or almost touch the exterior anode of the discharge device that will slip into the casing. This fin will likewise provide the helical path of water to effectively cool the surface of the exterior anode of the discharge device. The fin 24 may be fastened to the interior of the tube in any desired fashion as by welding, or the fin 24 may be a separate unit placed within the casing 21 to bear against the discharge device casing.

Fig. 3 illustrates how still further modifications may be made in the application of the invention. In Fig. 1, I have disclosed the corrugations in the water jacket member surrounding an exterior anode. The invention also can be applied to a metal casing as part of the cathode structure and also the corrugations may be inserted in the discharge casing in place of the corrugations in the water jacket. Fig. 3 illustrates such a combination in which the casing 30 has corrugations therein on the preferably cylindrical side, which corrugations start from a lower portion 31 and extend into a preferably continuous helix to the upper portion at 32. A metal casing member 33 is preferably slipped over this casing member 30 to form the helical path or duct 34 for the cooling medium such as water around the casing. The outlet 35 for the water or other cool-

ing medium is adjacent the termination 32 of the helical corrugations. I also prefer to corrugate the bottom of the discharge casing 36, preferably starting at the center where the inlet 37 is located in the bottom 38 of the water jacket. These corrugations, as more particularly disclosed in Fig. 4, start from a central portion 40 and provide a duct in a preferably spiral form 41 circling throughout the bottom until it reaches the corner edge 42 to provide the upward helical path around the side walls of the casing. It will thus be apparent that the cooling medium enters the inlet 37 and circulates very rapidly in a spiral path around the bottom portion and then in a helical path around the sides to the outlet.

The metal casing 30 for the discharge container preferably forms a part of the main electrode structure, such as disclosed in the drawings in which it forms a container and electric connector to the mercury pool 43. A cover plate 44 for the discharge casing member 30 may likewise form an additional cover for the jacket member 33. I have likewise disclosed a particular type of anode and auxiliary electrode lead-in structure comprising a tubular member 45 welded to the cover member 44 about the opening 46. A porcelain member 47 is sealed to this tubular member and to a perforated metal member 48, which is sealed, in turn, to another hollow porcelain member 49 having a metal cap 50 closing the opening 51 therein. The auxiliary electrode is preferably in the form of a make alive 52 of boron carbide or carborundum and is connected by rod 53 to the cap 50, which has an exterior connection 54 thereto. An insulating sleeve 55 surrounds the major portion of the rod 53. The perforated metal member 48 supports a cylindrical metal conductor 56 surrounding the make alive structure and insulated from the casing by another insulating sleeve 57. This tubular conductor supports on its

lower end at the desired height above the mercury an anode 58.

The casing in Fig. 1 may, of course, be corrugated in addition to or in place of the water jacket member and likewise the water jacket member of Fig. 3 may be corrugated in addition to, or in place of, the corrugation of the container wall. The invention can also be applied to other types of discharge devices.

While I have shown and described preferred modifications of my invention, it is apparent that many other modifications besides those mentioned, can be made without departing from the spirit of my invention. This is especially true in adapting the cooling means to the particular shape of the discharge device. Accordingly, I desire only such limitations to be imposed upon the following claims as are necessitated by the prior art.

I claim as my invention:

1. A discharge device having a metal member as an electrode structure, and a water jacket comprising a metal member adapted to slip over and enclose said electrode structure, one of said metal members having helical corrugations on its bottom and side walls directing a cooling medium in a helical path about said electrode structure.

2. A discharge device having a metal member as an electrode structure, and a water jacket comprising a metal member adapted to slip over and enclose said electrode structure, one of said metal members having helical corrugations on its bottom and side walls in series, said water jacket member having an opening in the bottom portion and another at the side wall whereby a cooling medium may be continuously circulated in a helical path on said bottom and side of said electrode.

WALTER E. BAHLIS.