Nov. 1, 1949 C. M. OSTERHELD 2,486,871

ANTICORROSION UNIT

Filed May 28, 1945

Fig-1

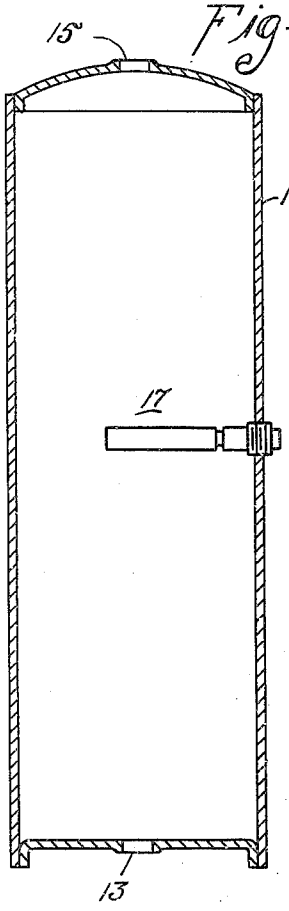


Fig-2

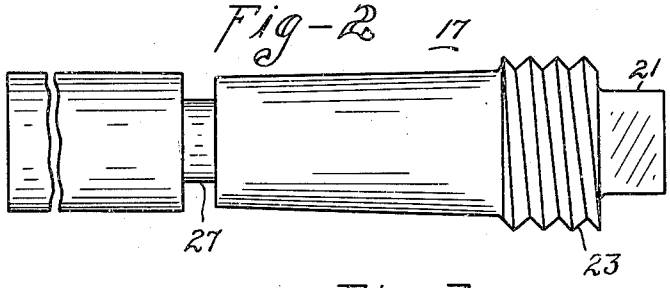


Fig-3

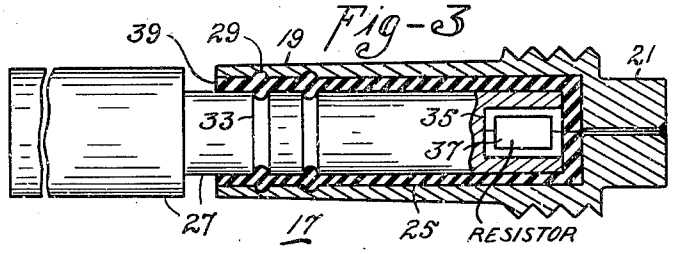


Fig-4

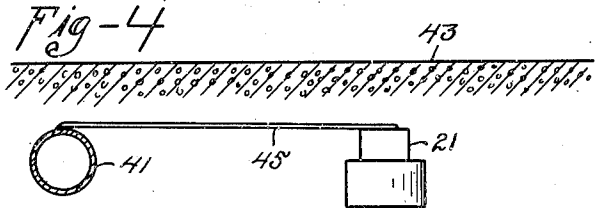
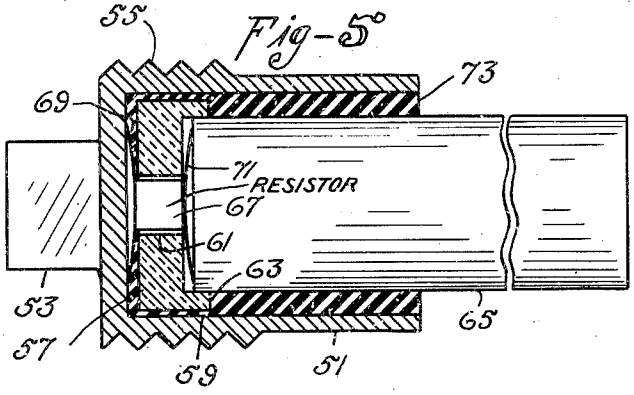


Fig-5



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ANTICORROSION UNIT

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9 Claims. (Cl. 204—197)

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My invention relates to corrosion preventing means and particularly to such means comprising a resistance element.

An object of my invention is to provide a corrosion preventing unit that shall be usable in a variety of different applications and under different conditions.

Another object of my invention is to provide a corrosion preventing unit that shall be of use both in a metal hot water tank to prevent corrosion of the interior thereof as well as in the ground in preventing the corrosion of iron pipes buried in the ground.

Other objects of my invention will either appear during a description of several forms of device embodying my invention or will be pointed out during the course of such description and set forth in the appended claims.

In the drawings,

Figure 1 is a vertical section through a hot water tank embodying the device embodying my invention,

Fig. 2 is a view in side elevation of the device,

Fig. 3 is a view, partly in elevation and partly in vertical, longitudinal section, corresponding to Fig. 2,

Fig. 4 is an assembly view of another use of the unit embodying my invention, and

Fig. 5 is a view in partial section of a still further modification.

Referring first of all to Fig. 1 of the drawings, I have there shown an ordinary iron domestic hot water tank 11 having a lower cold water inlet opening 13 and an upper hot water outlet opening 15. While I have elected to show a standard domestic hot water tank ,my invention is not limited solely to use in such hot water tanks and it is therefore to be understood that any water tank subject to corrosion may be substituted therefor.

I have shown an anti-corrosion unit 17 as having screw-threaded engagement with one of the walls of the tank 11, in this case a side wall and substantially intermediate the ends of the tank.

Referring now to Figs. 2 and 3 of the drawings, I have there illustrated the anti-corrosion unit 17 as comprising a metallic head 19 which may be made of iron. Member 19 is provided with a square outer end 21, and with an intermediate screw-threaded portion 23, so that the unit may be screwed into and out of a cooperating opening in a tank. The screw-threaded portion 23 may be of any suitable or desired diameter so that it will fit into an opening in one of the walls of the tank 11 in a fluid-tight manner. The head 19 is

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hollow, having an opening 25 in its inner end, which opening is adapted to receive an end portion of a metallic member 27 which is made of metal anodic relatively to the tank metal, here iron. While I do not desire to be limited thereto, I have found that making the member 27 of magnesium, gives very good results for more than one reason.

The inner surface of recess or opening 25 is provided with a pair of spaced annular grooves 29 for a purpose which will hereinafter appear. The outer surface of the reduced end portion of the anodic metallic member 27 is also provided with a pair of annular grooves 33 which are preferably so positioned relatively to each other and relatively to the annular grooves 29 on the inner surface of the walls surrounding the openings 25, as to be aligned therewith.

The inner end portion of member 27 is provided with a recess 35 opening at the end thereof, in which I locate a resistor unit 37, the ends of the said resistor unit being connected to member 27 of the anodic metal and to the head 19 and particularly to the square end 21.

I may, in the course of assembly of the unit, position the member 27 of anodic metal in its proper operative position substantially as shown in Fig. 3 of the drawings with the resistor unit 37 being in the recess 35 and with the terminals thereof electrically connected as described hereinbefore after which I may pour in a filling 39 of an insoluble, non-absorptive phenolic condensation product, such as Bakelite. After pouring in the initially plastic, thermo-settable electric-insulating material, the entire unit is then subjected to a baking operation in order to cause solidification of the electric-insulating material which will tend to hold the member 27 in its fixed position relatively to the head 19. The grooves 29 and 33 will tend to anchor the two members 19 and 31 in fixed positions relatively to each other, even though they are handled roughly during installation.

Referring now to Fig. 4 of the drawings, I have there illustrated an iron pipe 41 interred in the ground below the surface 43 thereof. It has been found that buried iron pipe is subject to electrolytic action because of the chemicals found in the soil. I provide an anti-corrosion unit 17 which is also buried below the surface of the ground and is connected with the pipe 41 as by a conductor 45 which is suitably soldered, brazed or welded to both the pipe 41 as well as to the head portion 21. The interior construction will be the same as in Fig. 3.

Referring now to Fig. 5, I have there shown another modification adapted to relatively large metal tank units. A hollow head 51 has a square end 53 at its closed end and may have a screw-threaded portion 55 adjacent end 53 to permit of its being screwed into a large opening provided for that purpose in a tank. A spacer 57 which may be made of porcelain, has an outer diameter slightly less than the diameter of an opening 59 in head 51. It has a central opening 61 therein and has an annulus 63 at its outer end, the inner periphery of which is adapted to engage with the inner end of an anodic member 65 which is preferably made of magnesium.

A preformed resistor 67 is positioned within the central opening 61 and has its respective terminals secured to two dished discs 69 and 71 positioned adjacent the respective ends of spacer 57. During the assembly of the unit the head 51 may be fixedly held with its recessed end uppermost, the spacer with the resistor and the two dished discs electrically connected thereto may then be dropped into the opening 59 after which the member 65 may be placed in its proper operative position in opening 59 and within the annulus 63. Then any suitable thermo setting electric-insulating material 73, such as filler 39 in Fig. 3, may be applied while heated to cause it to flow and then allowed to cool, harden and set whereby the parts of the assembly will be held in fixed positions relatively to each other. The degree of hardening should be such that it may be driven into the ground as shown in Fig. 4, without damage.

The conditions as regards the acidity of the water to which the members 17 or 65 are subjected when applied or used in a tank 11 as well as when they are connected with an iron pipe 41 varies and since I desire to provide anti-corrosion means in combination with an iron pipe or an iron tank subject to water of varying degrees of acidity, I may use resistors 37 or 67 having an ohmic resistance which varies between, say 5 ohms to 200 ohms although it is possible that a value on the order of 25 ohms may meet substantially all of the normal operating conditions. Generally I may say that I prefer to use a resistor 37 or 67, the ohmic value of which is such that a current flow of one ampere per 3000 to 5000 square feet of iron surface to be protected is obtained.

Extended tests on my part have shown that when an anti-corrosion unit such as unit 17 or 51 is used in a hot water tank, if the anodic metallic metal element 27 or 65 is made of magnesium, there will be a potential difference of about 1.4 volts between the iron tank and the anodic member 27 or 65. Substantially the same conditions may obtain when an anti-corrosion unit is buried in the soil and has its iron head connected with an iron pipe. This potential difference, particularly in a hot water tank, is sufficiently great so that no dissociation of the inner surface of the iron tank 11 will occur even through the tank contain slightly acidulous water. The voltage between the tank and the anodic member is high enough so that, irrespective of the position of the anti-corrosion unit in the tank, the potential difference between the tank and the anodic element will be sufficiently high to insure current flowing from the anodic element to the iron of the tank at the point farthest away from the anodic element. A current will flow from the anodic element through the water and to the iron surface, the amount or value of such current being dependent upon the value of the ohmic resistance of the resistor 37 or 67 which is designed or selected to give the above-mentioned current density. Thus by increasing the resistance of resistor 37 or 67, the amount of current flowing through the resistor will be decreased and the rate of dissociation of the anodic member 27 or 65 will be reduced, that is the life of the anodic member 27 or 65 will be increased.

In all embodiments the solid plastic filling serves a dual purpose. It holds the end portion of the metal anode member in the head and spaces the end portion from direct electrical connection with the metal of the head and permits electrical connection of the end portion of the head through the electrical resistor. When the embodiments of Figs. 2, 3 and 5 are installed in a water tank the electric circuit between the anode member and the tank is completed through the head, which makes metallic contact with the tank wall. The metal head in the embodiment of Fig. 4 also constitutes a portion of the electrical circuit between the anode member and the pipe to be protected. It will be noted that in all embodiments the necessity for securing bolts or other fastening elements, likewise electrical terminal elements, is dispensed with.

Various modifications may be made in the device embodying my invention without departing from the spirit or scope thereof and all such modifications clearly coming within the scope of the appended claims are to be considered as being part of my invention.

I claim as my invention:

1. An anti-corrosion unit comprising a tubular metal head closed at one end, a metal anode member having an end portion extending into said head and spaced therefrom out of electrical contact, an electrical resistor in the head electrically connecting the head and the anode member, and a solid filling of plastic electric-insulating material in the head holding the head and anode member in fixed spaced relation to each other.

2. An anti-corrosion unit comprising a tubular metal head closed at one end, a metal anode member having an end portion extending into said head and spaced therefrom out of electrical contact, a solid filling of plastic electric-insulating material in the head holding the head and anode member in fixed spaced relation to each other, and an electrical resistor electrically interconnecting the head and the anode member and sealed in the head by the solid filling.

3. An anti-corrosion unit comprising a tubular metal head closed at one end, a member of magnesium having an end portion fitting into the head and spaced therefrom, a resistor having an ohmic resistance of between 5 and 200 ohms in the head electrically connecting the head and the member of magnesium and a filling of solid electric-insulating material in the head covering entirely the resistor and holding all of said members in fixed positions relatively to each other.

4. An anti-corrosion unit comprising a tubular iron head closed at one end, a rod of magnesium having an end portion fitting into the head and spaced therefrom, a resistor having an ohmic resistance of between 10 and 30 ohms in the head electrically connecting the head and the rod of magnesium, and a filling of solid electric-insulating material in the head covering entirely the resistor and holding all of said members in fixed positions relatively to each other.

5. An anti-corrosion unit for a hot water tank comprising a tubular iron head closed at one end, an externally screw-threaded intermediate

portion for water tight engagement with a hot water tank, annular grooves in the inner surface of the head at the open end thereof, an electrode of metal anodic to iron having an end portion extending into the tubular head and out of engagement with the walls thereof and having annular grooves in its outer surface, a resistor unit having a resistance of between 5 ohms and 200 ohms positioned in the recess of said end portion of the electrode and having its ends electrically connected to the electrode and the head, and a filling of solid electric-insulating material in the head filling the vacant space therein and holding all the parts in proper operative positions relatively to each other.

6. An anti-corrosion unit for an iron hot water tank, comprising a hollow circular iron head closed at one end, an externally screw-threaded intermediate portion for water tight engagement with a hot water tank, spaced annular grooves in the inner surface of said head adjacent the open end thereof, a rod of magnesium having an end portion of reduced diameter with spaced annular grooves thereon extending into said hollow head out of engagement with the walls thereof and having a recess in its end portion, a resistor unit having an ohmic resistance of between 10 and 30 ohms positioned in said recess in said rod and having its ends connected to said head and to said rod and a filling of solid electric-insulating material in the hollow iron head filling all the vacant space therein and holding all the parts of said unit in coaxial alinement with each other.

7. An anti-corrosion unit for an iron pipe buried in the ground, comprising a hollow iron head closed at one end and having spaced annular grooves therein adjacent the open end, an electrode of magnesium having an end portion of reduced size with spaced annular grooves in its outer surface extending into said hollow head out of engagement with the walls thereof and having a recess in its end portion, a resistor unit having an ohmic resistance of between 5 and 200 ohms in said recess in the reduced portion of said electrode out of contact with the walls thereof and a filling of solid electric-insulating material in said hollow iron head filling all the vacant space therein and holding all of said parts in proper operative positions relatively to each other when said unit is hammered into the ground.

8. An anti-corrosion unit comprising a tubular metal head closed at one end, a spacer of solid electric-insulating material in said head at said closed end, said spacer having an opening therein and having an outer annular peripheral shoulder at that end thereof away from the closed end of said head, a magnesium member having one end in and spaced from said tubular metal head and fitting within said peripheral annular shoulder, a resistor having an ohmic resistance of from 5 to 200 ohms located in the opening in said spacer electrically connected to the metal head and to said magnesium member and a filling of solid electric-insulating material in the head and holding all of said members in fixed positions relatively to each other.

9. An anti-corrosion unit comprising a hollow metal head closed at one end, a spacer of solid electric-insulating material in said hollow head at said closed end having a central opening therethrough, a magnesium rod having one end portion in said hollow head, a resistor unit having an ohmic resistance of from 10 to 30 ohms positioned in the central opening in and spaced from said spacer, a pair of dished metal discs, one at each side of said spacer, having the terminals of said resistor unit connected thereto and a filling of solid electric-insulating material in the head filling all of the otherwise unoccupied space in said head and holding said spacer and said magnesium rod in fixed positions in said head.

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