

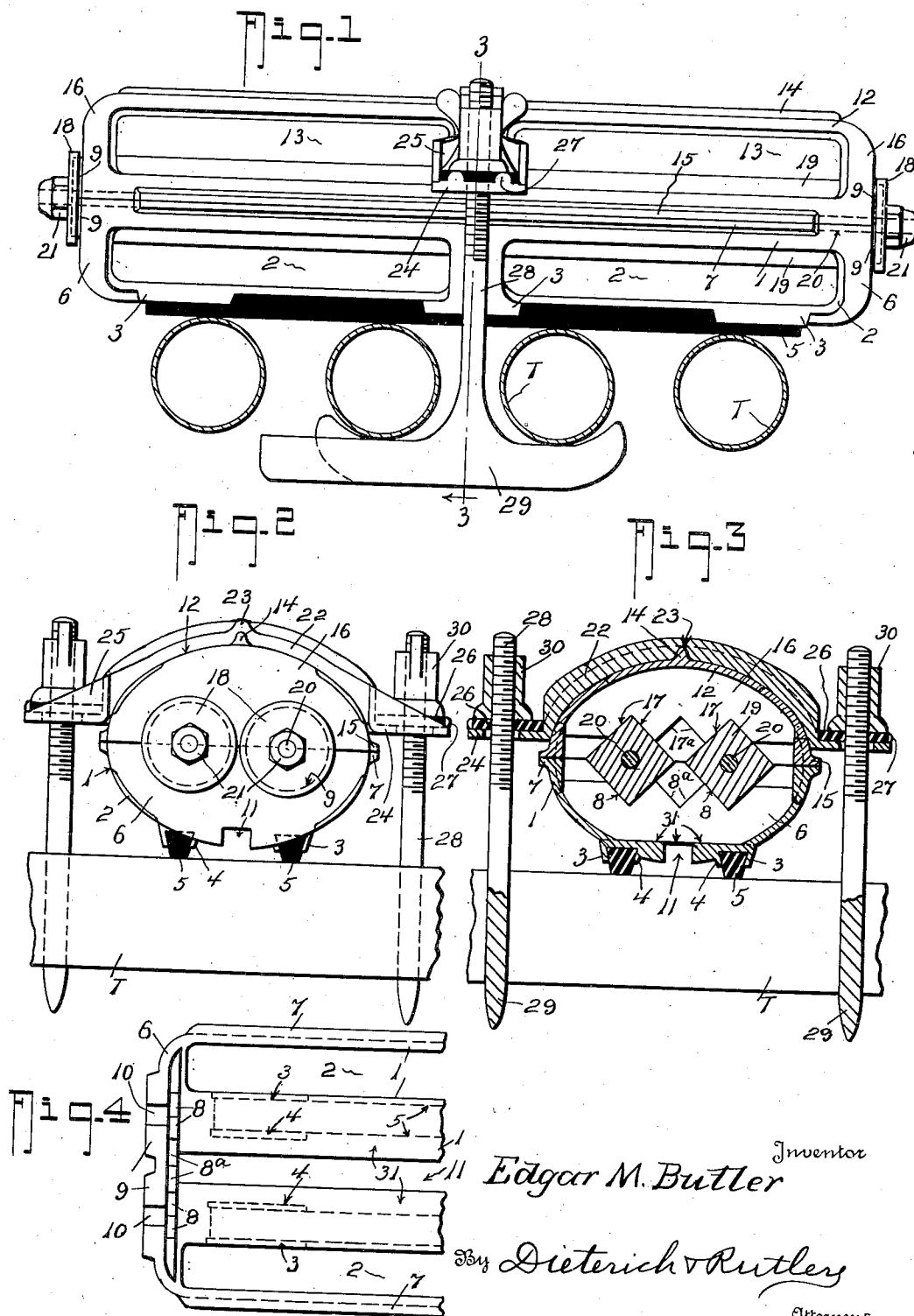
May 16, 1944.

E. M. BUTLER

2,348,882

ELECTROLYTIC WATER CORRECTION DEVICE

Filed June 12, 1940



Inventor
Edgar M. Butler

By *Dieterich & Rutley*

Attorneys

UNITED STATES PATENT OFFICE

2,348,882

ELECTROLYTIC WATER CORRECTION
DEVICE

Edgar M. Butler, New Orleans, La.

Application June 12, 1940, Serial No. 340,159

12 Claims. (Cl. 204—248)

My present invention relates to self-energizing devices for converting soluble mineral matter, found in most water, into small, solid particles.

More particularly, the invention relates to devices for preventing the formation of scale in boilers by the action of the device. The various salts, laid down by the unit itself, have the effect of building up an insulating wall around the various solid particles as they form, so that the salts responsible for encrustation and corrosion are more rapidly and completely precipitated, and may readily be removed as mud from the bottom of boilers or other vessels where the water contained therein is subject to differential temperatures.

A further object of the invention is to provide a unit for use in large boilers having ample space to receive a large unit.

Further, it is an object to provide a device of the character stated having a two-part case, with end recesses to receive one or more negative bars as may be desired without changing the case.

Again, it is an object to provide means to secure the device to and insulate it from boiler flue-tubes when used, especially, in ship and traveling boilers.

Another object is to provide a self-cleaning device wherein accumulation of precipitate or sludge, such as might clog it, is prevented by the provision of openings in the case of ample size and proper location.

More specifically, the invention seeks to improve the device which constitutes the subject matter of my application Ser. No. 275,329, filed May 18, 1939, and thereby increase its efficiency.

Other objects will in part be obvious and in part be pointed out hereinafter.

To the attainment of the aforesaid objects and ends the invention still further resides in the novel details of construction, combination and arrangement of parts, all of which will be first fully described in the following detailed description, and then be particularly pointed out in the appended claims, reference being had to the accompanying drawing, in which—

Fig. 1 is a side elevation of the device.

Fig. 2 is an end view of the same.

Fig. 3 is a cross-section on the line 3—3 of Fig. 1, showing two negative electrodes in place.

Fig. 4 is a detail plan view of one end of the lower member of the case.

In the drawing, in which like numbers and letters of reference designate like parts in all the figures, 1 represents the lower half of the case

and 12 the upper half. Both parts of the case preferably have strengthening ribs 7 and 15, respectively, along the longitudinal meeting edges.

The lower section or part of the case has long wide openings 2 and rows of lugs 3 and 4. These lugs 3 and 4 serve to secure insulator bars 5 to the under face of the bottom of the case, which bottom is provided with a wide slot 11 extending from end 6 to end 6 of the lower section of the case.

Each case half, 1, 12, has its respective ends 6, 16 provided with inner recesses 8, 17 and 8^a, 17^a for the reception of the ends of negative elements 19. The ends 6, 16 also have bosses 9 (half on one section of the case and half on the other) which bosses 9 have holes 10 for passage of the tie rods 20. Caps 18 fit over the bosses 9 and have holes for the rods 20 to pass through. The caps 18 are held in place by nuts 21 on the ends of the tie rods.

The upper section or half 12 of the case also has wide elongated openings 13 for circulation of the electrolyte. It is also provided with a rib 14 along its top which fits in a groove 23 in the yoke 22 of the clamp device.

The yoke 22 has apertured ears 24 reinforced by side ribs 25 and carrying insulating blocks 26 which are held in position by stop lugs 27 (see Figs. 1 and 3).

Clamp bolts 28 having cross-bars 29 are provided for securing the device to the boiler tubes T. The bolts 28 pass through the holes in the ears 24 and are held out of contact with the metal parts of the yoke by the blocks 26; winged nuts 30 on the bolts 28 engage the blocks 26 and draw the clamps tight to hold the device in place (Figs. 1, 2 and 3).

In assembling the device, if two negative elements 19 are used, these elements are bored to permit passage of the threaded rods 20 and the ends of the elements 19 with the inserted rods 20 are laid in the recesses 8 of the lower section 1; then the upper section is put on and the flanged washers 18 are placed over the bosses 9 and the nuts 21 are drawn up to squeeze the ends of the case together into tight contact with the ends of the negative elements. The nuts are drawn up as tightly as possible, the case being made sufficiently malleable, so that good physical and electrical contact is had over the entire end faces of the negative elements and the parts of the device are securely held together.

If only one negative element 19 is to be used, its ends are placed in the central end recesses 8^a,

17^a of the ends 6, 16 and the rods 20 then pass alongside of the negative element.

In stationary boilers the weight of the device itself is usually sufficient to prevent its displacement when once set in place on the tubes, but when used on marine boilers, for instance, the clamp 22, 29 becomes important.

It will be seen by reference to Fig. 3 that the bottom 31 inside the case is flat and the holes 2 extend clear to the bottom surface so any precipitate or sludge forming in the case can drop or flow out through the unobstructed openings 2 and 11.

The negative elements are preferably formed of hard compact metal such as rolled or drawn bars in order to reduce porosity and ensure a more uniform structure of the bar mass throughout its entire length. The negative element may be of a suitable metallic composition, such as zinc (which is the preferred metal used), bismuth, lead, tin, aluminum, antimony, used singly, or in whatever combination of these, with or without the addition of mercury, may be necessary to produce the most efficient result under the varying conditions of water, steam pressure, heat transfer, etc.

From the foregoing description, taken in connection with the accompanying drawing, it is thought that the construction, operation and advantages of the invention will be clear to those skilled in the art to which it relates.

What I claim is:

1. A self-energizing electrolytic water correction device, comprising an elongated case composed of an upper half and a lower half, the lower half having a flat bottom and elongated openings in its wall at the sides and adjacent said bottom to permit free outflow of sludge and precipitated matter, insulating bars secured in spaced relation to the bottom of the case to form rests therefor, the upper half of the case also having longitudinal elongated openings in its wall for free circulation of electrolyte, and at least one negative element held spaced from the longitudinal walls of the case with its ends in tight contact with the end walls of the case.

2. A self-energizing electrolytic water correction device, comprising an elongated case composed of an upper half and a lower half, the lower half having a flat bottom and elongated openings in its wall at the sides and adjacent said bottom to permit free outflow of sludge and precipitated matter, insulating bars secured in spaced relation to the bottom of the case to form rests therefor, the upper half of the case also having longitudinal elongated openings in its wall for free circulation of electrolyte, and at least one negative element held spaced from the longitudinal walls of the case with its ends in tight contact with the end walls of the case, said negative elements comprising rods of rolled metal.

3. A self-energizing electrolytic water correction device, comprising an elongated case composed of an upper half and a lower half, the lower half having a flat bottom and elongated openings in its wall at the sides and adjacent said bottom to permit free outflow of sludge and precipitated matter, insulating bars secured in spaced relation to the bottom of the case to form rests therefor, the upper half of the case also having longitudinal elongated openings in its wall for free circulation of electrolyte, and at least one negative element held spaced from the longitudinal walls of the case with its ends in tight contact with the end walls of the case, said negative elements comprising rods of drawn metal.

4. In a self-energizing electrolytic water correction device, an elongated case constituting a positive element and containing at least one negative element bar, said case having openings in its longitudinal walls, and being composed of a lower and an upper section, insulating bars secured to and beneath the lower section, and means to clamp said case sections together and to the boiler tubes.

5. A self-energizing electrolytic water correction device, an elongated case composed of a lower and an upper section, insulating bars secured to and beneath the lower section, means to clamp said case sections together and to the boiler tubes, said means comprising a cross yoke shaped to fit over the upper section of the case and having apertured ears, T-clamp members each including a bar to lie beneath the boiler tubes and a bolt to project up between the tubes and through said ears, and having clamping nuts to cooperate with said yoke, and means to insulate said bolts and nuts from said yoke.

6. In a self-energizing electrolytic water correction device, an elongated case composed of a lower and an upper section, insulating bars secured to and beneath the lower section, means to clamp said case sections together and to the boiler tubes, said means comprising a cross yoke shaped to fit over the upper section of the case and having apertured ears, T-clamp members each including a bar to lie beneath the boiler tubes and a bolt to project up between the tubes and through said ears, and having clamping nuts to cooperate with said yoke, and means to insulate said bolts and nuts from said yoke, said means to insulate comprising insulating blocks carried by said ears, through which said bolts pass and against which said nuts lie.

7. In a self-energizing electrolytic water correction device, an elongated case composed of a lower and an upper section, insulating bars secured to and beneath the lower section, and means to clamp said case sections together and to the boiler tubes, said upper section having a longitudinal top rib, and a yoke extending across said upper section and having a groove to receive said rib whereby the yoke can be located at any desired place in the length of the case and be held from swivelling about the axis of the case.

8. In a self-energizing electrolytic water correction device, an elongated case composed of a lower and an upper section, insulating bars secured to and beneath the lower section, means to clamp said case sections together and to the boiler tubes, said means comprising a cross yoke shaped to fit over the upper section of the case and having apertured ears, T-clamp members each including a bar to lie beneath the boiler tubes and a bolt to project up between the tubes and through said ears, and having clamping nuts to cooperate with said yoke, and means to insulate said bolts and nuts from said yoke, said upper section having a longitudinal top rib and said yoke having a groove to receive said rib whereby the yoke can be located at any desired place in the length of the case and be held from swivelling about the axis of the case.

9. In a self-energizing electrolytic water correction device, an elongated case constituting a positive element and containing at least one negative element bar, said case having wide, elongated longitudinal openings in its longitudinal walls, and being composed of a lower and an upper section, insulating bars secured to and beneath the lower section, means to clamp said

case sections together and to the outside of a plurality of boiler tubes, and means for applying pressure inwardly against the ends of the case to maintain tight contact between said ends and the adjacent ends of the negative element.

10. In a self-energizing electrolytic water correction device, an elongated case constituting a positive element and containing at least one negative element bar, said case having wide, elongated longitudinal openings in its longitudinal walls, and being composed of a lower and an upper section, insulating bars secured to and beneath the lower section, means to clamp said case sections together and to the outside of a plurality of boiler tubes, and means to hold the case sections together when said clamping means is inactive.

11. In a self-energizing electrolytic water correction device, an elongated case constituting a positive element and containing at least one negative element bar, said case having wide, elongated longitudinal openings in its longitudinal walls, and being composed of a lower and an

upper section, insulating bars secured to and beneath the lower section, means to clamp said case sections together and to the outside of a plurality of boiler tubes, and means to hold the case sections together when said clamping means is inactive, said last named means comprising complementary lugs on the ends of the case sections and flanged washers held over said lugs.

12. A self-energizing electrolytic water correction device having an elongated case constituting a positive element and composed of two halves divided by a plane which includes the longitudinal axis of the device, the ends of said case having internal half recesses, at least one negative element within the case held at its ends in said recesses when the case parts are assembled, insulating means on the under side of the lower case-half to set across and on a plurality of the tubes of the boiler in which the device is to be used, and means for simultaneously securing the case halves together and on and to boiler tubes.

EDGAR M. BUTLER.