June 15, 1943. E. M. BUTLER 2,321,796

WATER CORRECTION DEVICE

Filed June 10, 1940

Fig. 1

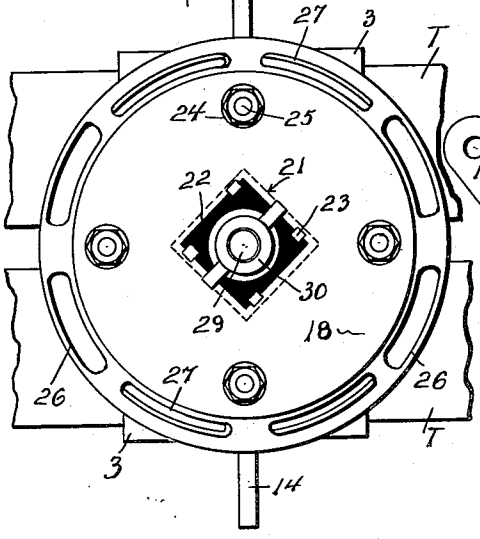


Fig. 2

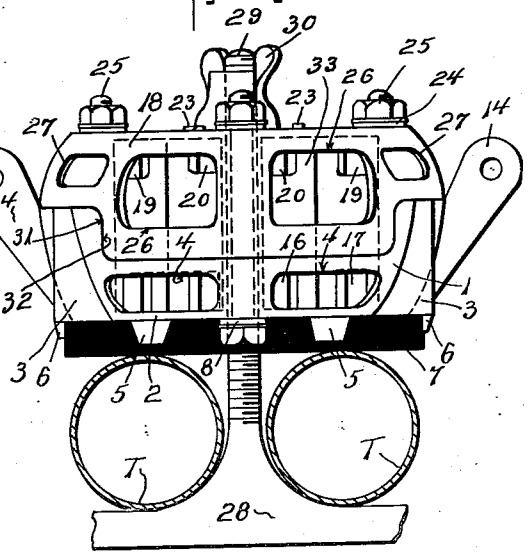


Fig. 3

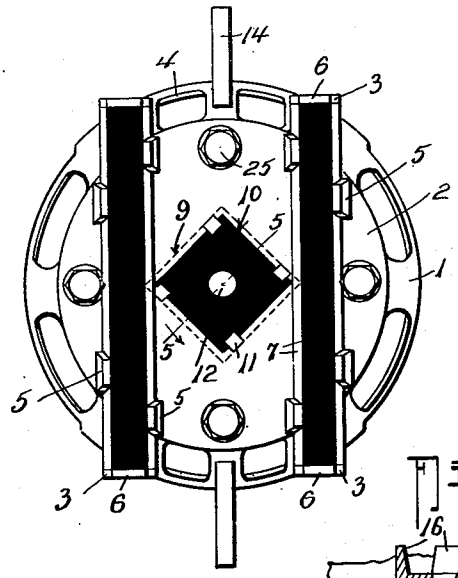


Fig. 4

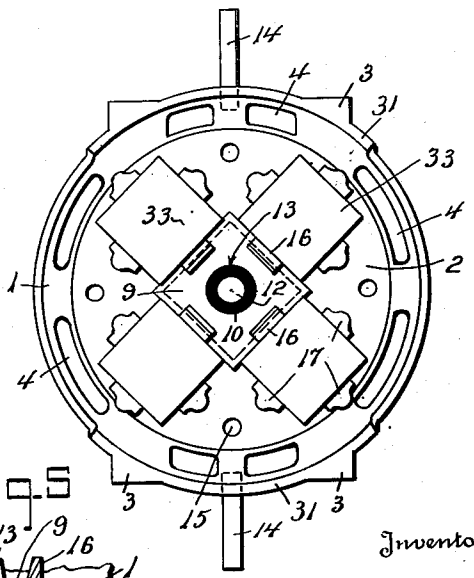
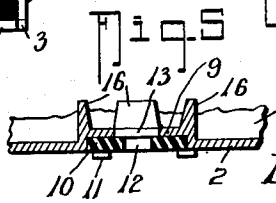


Fig. 5



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WATER CORRECTION DEVICE

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9 Claims. (Cl. 204—248)

My present invention relates to the art of water purification and especially to devices for preventing scale formation in boilers, vessels and water systems in which the water is subject to wide temperature differentials.

Primarily the invention has for an object to provide a device for the purpose stated of a compact nature which may be economically manufactured, and one which will effectively serve its intended purpose.

Further, the invention has for an object to provide a device for the purpose above referred to, which is in the form of a biscuit, i. e., has a case of a flat globular form.

Further, it is an object to provide a water correction device of the self-energizing kind, whose positive element is the case, the case being made of two halves having inter-projecting flanges with large water passages and between which a group of negative elements are symmetrically disposed and held in place by suitable lugs on the case halves and by cross bolts which secure the case halves together and in tight physical and good electrical contact with the ends of the several negative elements.

A further object is to provide a device of the character stated wherein the several negative elements are separate from one another and may individually be replaced when desired.

Further, it is an object to provide means whereby the device may be secured to boiler tubes or similar structures and well insulated therefrom.

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 top plan view of one of my devices secured to two boiler flue-tubes.

Fig. 2 is an elevation of the device looking from right to left in Fig. 1.

Fig. 3 is an inverted plan view of the device per se.

Fig. 4 is a top plan view of the lower half of the case with a set of negative blocks in place.

Fig. 5 is a detail section on the line 5—5 of Fig. 3.

Referring now to the accompanying drawing, in which like numbers and letters of reference indicate like parts in all the figures, 1 represents the lower half of the case, the bottom 2 of which is provided with side lugs 5 to cooperate with end lugs 6 on the extensions 3 in holding two bars 7 of insulation (stone, or any other suitable substance) to rest on boiler tubes T (Fig. 2). The annular wall of the case half 1 has elongated openings 4, the bottoms of which are preferably at the level of the bottom 2 so as to serve not only as water circulating openings but also as passages through which any sediment or precipitate that may form within the case can flow out.

Bosses 8 are formed on the under side of the bottom 2 and are apertured, as at 15, for the passage of bolts 25 having nuts for clamping the parts of the device in assembled relation.

The bottom 2 has a recess in its bottom formed by the inwardly projected part 9. Into the recess thus formed is placed a block 10 of suitable insulation. The block 10 is apertured, as at 12, for the passage of a clamp bolt 29 and is secured in place by bent-over lugs 11. The part 9 is also apertured as at 13 to permit passage of the bolt 29 without its touching the metal of the case.

Apertured wings 14 project from the annular wall of the lower half of the case so that several units may be secured together when desired.

Suitably spaced lugs 16 on the projection 9, and 17 on the bottom 2, are arranged in groups to receive between them the blocks 33 which constitute the negative element of the device. These blocks are preferably formed of hardened, rolled or drawn, metallic substance such as zinc (the preferable metal used), bismuth, lead, tin, aluminum, antimony, used singly or in whatever combination with one another or with mercury may be found necessary to produce the most efficient result under the varying conditions of water, steam-pressure, heat transfer, etc. The positive element (case) is preferably made of copper and may be cast metal. It is essential, however, to the greatest efficiency that the negative element be not cast, but rolled or drawn metal so as to reduce its porosity as much as possible and thus prevent the electrolyte from entering the body of the negative element and insuring that it be dissolved from the outer surface inwardly and not from the interior outwardly, which would cause blisters to form and the electrode to corrode.

The upper half 18 of the case fits on the lower half. The annular walls of the two halves have alternate recesses and projections 32—31 whereby

the two parts may be said to interengage and thus prevent rotation of the one with respect to the other about their common axis.

The annular wall of the upper half of the case is provided with enlarged openings 26 and 27 for water circulation.

Lugs 19 and 20 on the inside of the upper half 18 of the case are spaced to correspond with the lugs 17, 16 respectively of the lower half 1 of the case, to fit over the upper ends of the negative blocks 33 when the parts are assembled.

The upper half of the case also has an inward projection 21, similar to the projection 9, on which the lugs 20 are located and which forms a recess or seat for a second block of insulation 22 that is held in place by bendable lugs 23 and which has a hole for the passage of bolt 29. A winged nut 30 on bolt 29 bears against insulation block 22 when clamp 28 is used to secure the device to boiler tubes T.

In assembling the parts, the blocks 33 of negative material, cut to equal lengths, are set into the spaces provided between the lugs 16, 17 of a group in the lower half of the case; the upper half is then fitted over the blocks 33 and the lower half of the case, and secured by the bolts 25 whose nuts are drawn as tightly as possible to ensure the best obtainable physical and electrical contact between the end faces of the blocks 33 and the upper and lower parts of the case 1, 18. The pressure or squeeze obtained through the bolts and nuts (25) may be augmented by the clamp, 28, 29, 30 when the device is to be anchored to the boiler tubes T.

From the foregoing it will be obvious that: the capacity of the unit is great for a given volume of space occupied in the boiler, vessel, circulating system, etc.; that the size of the unit will depend in large measure on the number of negative blocks 33 employed; that, by arranging the openings 4 as shown, clogging of the device by precipitate or sludge is avoided; that to replace consumed negative blocks 33 is a simple matter and the positive case can be used indefinitely; and that the device is well insulated from the structure by which it is supported or to which it is clamped.

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

What I claim is:

1. In a self-energizing electrolytic water correction device, a case of electro-positive metal formed of an upper cup-like member and a lower cup-like member, said members having annular rims, provided with enlarged openings for circulation of electrolyte, said upper and lower case members each having inwardly projected sets of lugs, those of the lower member cooperating with those of the upper member, a plurality of electro-negative blocks held between said upper and said lower case members with their ends embraced by said lugs and their end faces in contact with said upper and lower case members and held in spaced relation by said lugs, and means to secure the case members together and apply a compression force endwise against said negative blocks.

2. In a self-energizing electrolytic water correction device, a case of electro-positive metal formed of an upper cup-like member and a lower cup-like member, said members having annular rims with interprojected portions, provided with enlarged openings for circulation of electrolyte, said upper and lower case members each having inwardly projected sets of lugs, those of the lower member cooperating with those of the upper member, a plurality of electro-negative blocks held between said upper and said lower case members with their ends embraced by said lugs and their end faces in contact with said upper and lower case members and held in spaced relation by said lugs, and means to secure the case members together and apply a compression force endwise against said negative blocks.

3. In a self-energizing electrolytic water correction device, a case of electro-positive metal formed of an upper cup-like member and a lower cup-like member, said members having annular rims, provided with enlarged openings for circulation of electrolyte, the lower cup-like member having its openings positioned so as to drain the bottom of the case, said upper and lower case members each having inwardly projected sets of lugs, those of the lower member cooperating with those of the upper member, a plurality of electro-negative blocks held between said upper and said lower case members with their ends embraced by said lugs and their end faces in contact with said upper and lower case members and held in spaced relation by said lugs, and means to secure the case members together and apply a compression force endwise against said negative blocks.

4. In a self-energizing electrolytic water correction device, a case of electro-positive metal formed of an upper cup-like member and a lower cup-like member, said members having annular rims, provided with enlarged openings for circulation of electrolyte, said upper and lower case members each having inwardly projected sets of lugs, those of the lower member cooperating with those of the upper member, a plurality of electro-negative blocks held between said upper and said lower case members with their ends embraced by said lugs and their end faces in contact with said upper and lower case members and held in spaced relation by said lugs, means to secure the case members together and apply a compression force endwise against said negative blocks, the lower case member on its bottom having spaced rows of lugs, and bars of insulation held by said rows of lugs.

5. In a self-energizing electrolytic water correction device, a case of electro-positive metal formed of an upper cup-like member and a lower cup-like member, said members having annular rims, provided with enlarged openings for circulation of electrolyte, said upper and lower case members each having inwardly projected sets of lugs, those of the lower member cooperating with those of the upper member, a plurality of electro-negative blocks held between said upper and said lower case members with their ends embraced by said lugs and their end faces in contact with said upper and lower case members and held in spaced relation by said lugs, means to secure the case members together and apply a compression force endwise against said negative blocks, the lower case member on its bottom having spaced rows of lugs, bars of insulation held by said rows of lugs, said case having top and bottom openings, and insulating blocks secured in said upper and lower case members across said openings and apertured to receive a clamp bolt.

6. In a self-energizing electrolytic water correction device, a case of electro-positive metal formed of an upper cup-like member and a lower cup-like member, said members having annular

rims, provided with enlarged openings for circulation ef electrolyte, said upper and lower case members each having inwardly projected sets of lugs, those of the lower member cooperating with those of the upper member, a plurality of electronegative blocks held between said upper and said lower case members with their ends embraced by said lugs and their end faces in contact with said upper and lower case members and held in spaced relation by said lugs, and means to secure the case members together and apply a compression force endwise against said negative blocks, said last named means comprising bolts with nuts passing through bolt holes in the case clear of said negative elements.

7. In a self-energizing electrolytic water correction device, a case of electro-positive metal formed of an upper cup-like member and a lower cup-like member, said members having annular rims, provided with eniarged openings for circulation of electrolyte, said upper and lower case members each having inwardly projected sets of lugs, those of the lower member cooperating with those of the upper member, a plurality of electronegative blocks held between said upper and said lower case members with their ends embraced by said lugs and their end faces in contact with said upper and lower case members and held in spaced relation by said lugs, and means to secure the case members together and apply a compression force endwise against said negative blocks, the bottom of said lower case member being flat inside the case and the openings in the annular rim of said lower case member having their lower edges flush with said bottom by virtue of which precipitate forming within the case will flow freely out through said last named openings.

8. In a self-energizing electrolytic water correction device, a case of electro-positive metal formed of an upper cup-like member and a lower cup-like member, said members having annular rims, provided with enlarged openings for circulation of electrolyte, said upper and lower case members each having inwardly projected sets of lugs, those of the lower member cooperating with those of the upper member, a plurality of electronegative blocks held between said upper and said lower case members with their ends embraced by said lugs and their end faces in contact with said upper and lower case members and held in spaced relation by said lugs, and means to secure the case members together and apply a compression force endwise against said negative blocks, said upper and lower case members having inwardly depressed apertured portions forming recesses, and apertured insulation blocks held in said recesses, said means including a clamp bolt passing through said apertured insulating blocks.

9. In a self-energizing electrolytic water correction device, a case of electro-positive metal formed of an upper cup-like member and a lower cup-like member, said members having annular rims, provided with enlarged openings for circulation of electrolyte, said upper and lower case members each having inwardly projected sets of lugs, those of the lower member cooperating with those of the upper member, a plurality of electronegative blocks held between said upper and said lower case members with their ends embraced by said lugs and their end faces in contact with said upper and lower case members and held in spaced relation by said lugs, and means to secure the case members together and apply a compression force endwise against said negative blocks, said upper and lower case members having inwardly depressed apertured portions forming recesses, and apertured insulation blocks held in said recesses, certain of said lugs being located on said depressed portions of the case, said means including a clamp bolt passing through said apertured insulating blocks.

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