(No Model.)

S. L. BAILEY.

FEED WATER PURIFIER.

No. 537,139. Patented Apr. 9, 1895.

FIG. 1.

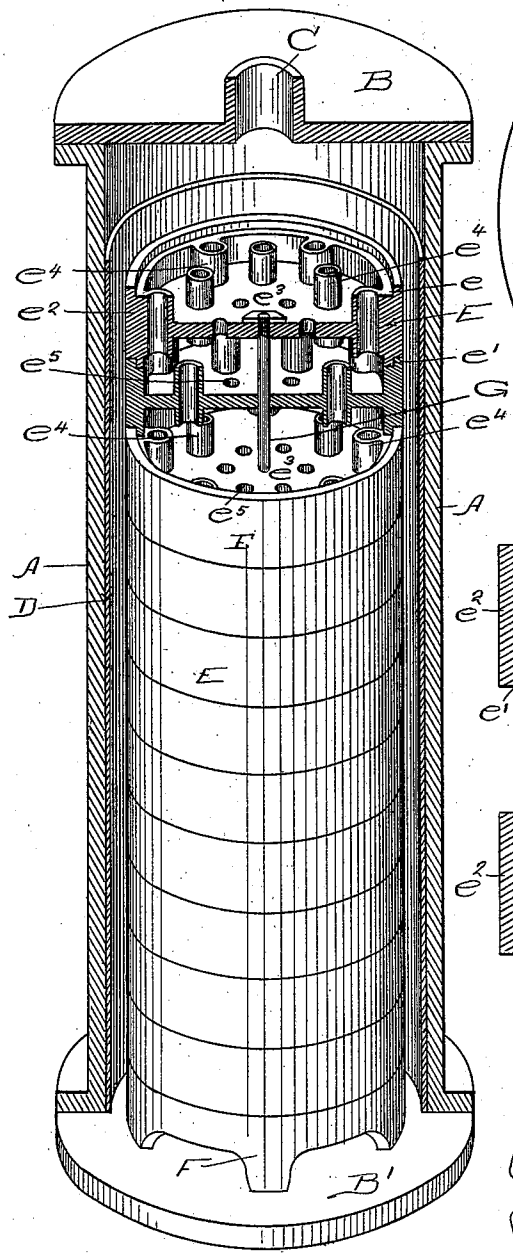


FIG. 2

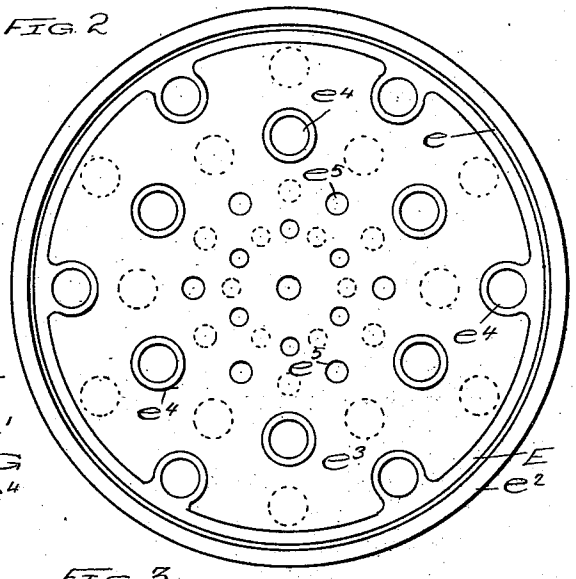


FIG. 3.

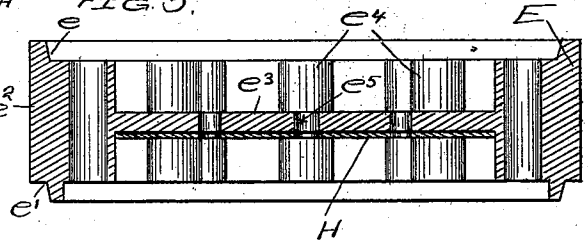


FIG. 4.

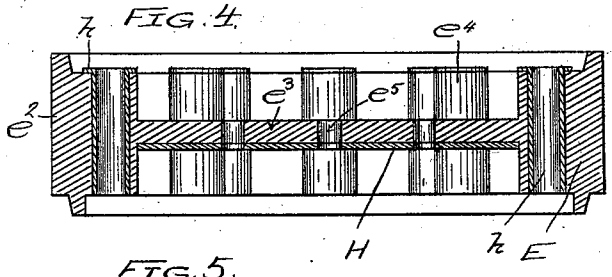
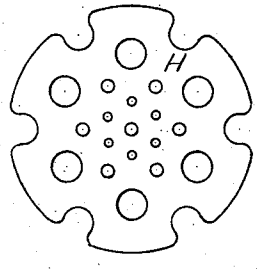


FIG. 5.



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FEED-WATER PURIFIER.

SPECIFICATION forming part of Letters Patent No. 537,139, dated April 9, 1895.

Application filed December 29, 1894. Serial No. 533,263. (No model.)

To all whom it may concern:

Be it known that I, STERLING L. BAILEY, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Feed-Water Purifiers, of which the following is a specification.

My invention relates to that class of water purifiers in which a galvanic action is, or is supposed to be, produced, by the passage of water over surfaces of relatively positive and negative metals, and the invention consists in the new construction and arrangement of the galvanic elements as hereinafter set forth, whereby the apparatus is rendered cheap and simple in construction, effective in operation and convenient to clean and repair.

In the accompanying drawings, which form a part of this specification, Figure 1 is a sectional perspective view of my improved apparatus. Fig. 2 is a plan view of one of the rings removed from the cylinder or casing. Fig. 3 is a cross section of the ring shown in Fig. 2, and Fig. 4 is a similar cross section indicating a slight modification. Figs. 2, 3 and 4 are upon a larger scale than Fig. 1. Fig. 5 is a face view of sheet H detached. This figure is upon a scale approximating to the scale of Fig. 1.

In said drawings A represents a cylindrical shell or casing which may be made of cast iron, and which is provided with heads or ends B, B′. In the center of the head B is an outlet C, and in the center of the head B′ is a similar inlet or opening which is not seen in the drawings. For the double purpose of lessening the corrosion of the inner surface of the cast iron shell, and for increasing the amount of zinc surface for the water to come in contact with, I line the cast iron shell with a sheet of zinc D, which in the drawings is shown as extending only part of the length of the cylinder, but which in practice I prefer shall extend completely from one head to the other. This zinc surface also facilitates the flow of the water through the apparatus by offering a smoother surface than the inner cast iron surface of the cylinder would otherwise present.

Centrally within the cylindrical shell I place a series of rings E E, &c., the edges of which are rabbeted, as at *e e′*, so that they will fit one upon another; and at the bottom of the series is placed a circular stool F, the upper edge of which is rabbeted to correspond with and receive the lowermost ring E of the series.

A central rod G, which may preferably be made of copper, extends through the whole series of rings and through the stool F, and said rod being headed at one end and screw threaded at the other to receive a nut offers means for securing the rings and stool firmly together. This rod I sometimes extend through one or both of the heads of the cylinder in cases where it is necessary to keep the series of rings centrally positioned.

The rings E I make of cast zinc in the form now to be described: A band or annular portion e^2 forms the exterior body or portion, and it is upon the upper and lower edges of this portion that the rabbets *e* and *e′* are formed. Filling this ring or body portion is the web or diaphragm e^3 located in the middle, and which thus leaves a hollow space on both faces within the ring. Cast in this diaphragm are a number of tubular projections e^4; and nearer the center are a number of perforations e^5 through the diaphragm. A sheet of copper H is cut to fit the cavity with perforations which fit over the tubular projections e^4 and others corresponding with the holes e^5. By this simple device I obtain a large amount of copper surface at small expense. In placing the rings in the series I arrange them so that the tubular projections e^4 and holes e^5 in that ring will come between the tubes and holes of the next ring. This arrangement is indicated at Fig. 2, where the full lines indicate the tubes and holes of one ring, and the dotted lines indicate the tubes and holes of the next ring below it.

The stool F is made with holes which may correspond in position with the tubes and holes in the rings.

The water passing in at the bottom of the casing or cylinder flows partly within and partly without the series of rings, a thin sheet flowing between the rings and the zinc lining of the cylinder. That portion of the water which flows up through the rings, passes principally through the tubular projections e^4. Rising through the projections e^4 the water in each case impinges against the copper sur-

face of the sheet H, owing to the staggered or alternating arrangement of the tubular projections of the alternating rings. It thence descends impinging against the zinc surface of the diaphragm e^3, and thence rising passes through the tubes of the ring above, and so on through the series. In like manner the water which passes through the holes e^5 strikes the copper plate above and thence flows through ring after ring, coming in contact alternately with copper and zinc on its passage. At the upper end of the series the water which has passed through the interior of the rings alternately in contact with zinc and copper unites with the water which has passed in contact with zinc in the narrow passage outside of the rings, and the entire volume flows out of the exit whence it may be led to the steam boiler.

Where a larger relative amount of copper surface than the above described arrangement gives, is desired, the copper sheet H may be duplicated so that each ring will have a copper sheet above and below, that is to say on the upper surface and on the lower surface. Another arrangement, which is in the nature of a modification, is illustrated at Fig. 4, in which the copper surface is increased by lining the tubular projections e^4 with copper tubes h, rimmed at the top and slipped in place and held by friction.

It will be observed that the construction is such that all the rings E may be cast from the same pattern and arranged in the pile so that the tubes and holes will alternate in position, by simply turning the rings one upon the other. Moreover it will be observed that the relative amount of contact which the water makes with the two elements, zinc and copper, may be regulated at will by simply turning the rings with relation to each other so that the current of water through the series will be more or less tortuous as desired; and also that this relation of the elements may, conveniently and easily, be still further varied, to suit any requirement, by duplicating the sheet of copper H, or by lining the tubular projections e^4 with copper, either or both, and the apparatus thus adapted to suit any of the various requirements.

It will also be observed that the construction is exceedingly cheap and durable in character, and that the whole apparatus may be readily taken apart for cleaning when desired.

I have described the rings as being made of cast zinc, while the copper element, the more expensive metal, is in the form of a sheet, the lining G of the cylinder being however of sheet zinc, as this is an extensive surface; and this is the construction which I prefer of course; but some of the results of my invention may be obtained by reversing the relation of the two metals, that is to say by casting the rings of copper, using sheet copper to line the cylinder and using sheet zinc to line the rings.

It is not necessary in all cases to provide each ring with a copper lining or surface. It will often be enough and answer the purpose to line every other alternate ring with copper in the manner above described, each alternate one of the rings being plain unlined zinc; and I do not wish to limit myself to having a copper lining in all of the rings.

I claim—

1. In combination with a shell or casing, a pile or core consisting of a series of metal rings placed one upon another, each ring consisting of a peripheral band, a central diaphragm, projecting tubes arranged in the diaphragm, and a sheet lining for some of the rings of relatively positive or negative metal, substantially as specified.

2. The ring E made of cast zinc, consisting of the rim e^2, the diaphragm e^3, the projecting tubes e^4 and the perforations e^5, substantially as specified.

3. The ring E made of cast zinc, consisting of the rim e^2, the diaphragm e^3, the projecting tubes e^4 and the perforations e^5, in combination with a sheet copper lining applied thereto, substantially as specified.

4. The ring E made of cast zinc, consisting of the rim e^2, the diaphragm e^3, the projecting tubes e^4 and the perforations e^5, in combination with a sheet copper lining applied thereto in the form of a circular perforated sheet H, substantially as specified.

5. In combination with a shell or casing, an internal core or pile composed of the rings E resting one upon the other, each having a rim e^2, a diaphragm e^3 and tubular projections e^4, each alternate ring being turned to cause the tubular projections to be staggered or alternated in position, and a copper element added in the form of a lining to some of the rings, substantially as specified.

6. In combination with a shell or casing, an internal core or pile composed of the rings E resting one upon the other, each having a rim e^2, a diaphragm e^3 and tubular projections e^4, each alternate ring being turned to cause the tubular projections to be staggered or alternated in position, and a copper element added in the form of a lining to some of the rings, said copper lining being a perforated sheet of copper applied to the surface of the diaphragm, substantially as specified.

STERLING L. BAILEY.

Witnesses:
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