

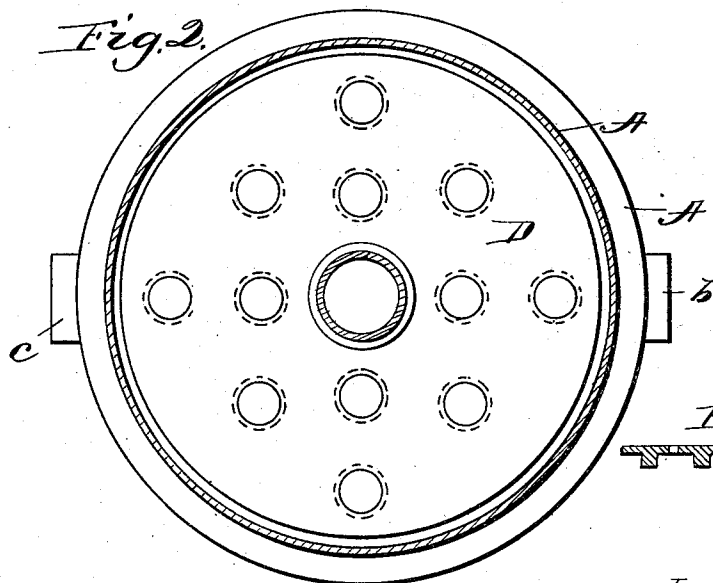
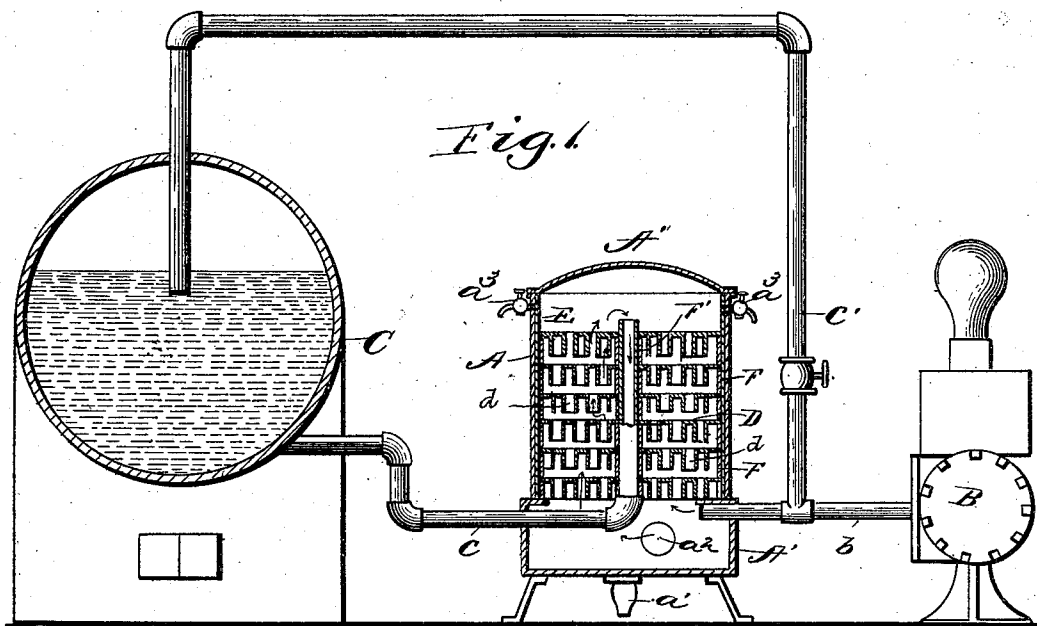
(No Model.)

S. G. CABELL.

APPARATUS FOR PURIFYING WATER BY GALVANIC ACTION.

No. 549,436.

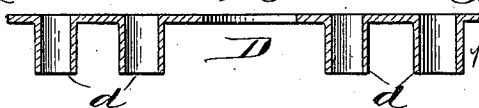
Patented Nov. 5, 1895.



Witnesses
J. M. Fowler Jr.
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Fig. 3.

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UNITED STATES PATENT OFFICE.

SAMUEL G. CABELL, OF WASHINGTON, DISTRICT OF COLUMBIA.

APPARATUS FOR PURIFYING WATER BY GALVANIC ACTION.

SPECIFICATION forming part of Letters Patent No. 549,436, dated November 5, 1895.

Application filed February 15, 1895. Serial No. 538,469. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL G. CABELL, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Apparatus for Purifying Water by Galvanic Action; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

15 This invention has relation to certain improvements in electrochemical apparatuses for freeing feed-water from scale-producing impurities by galvanic action; and its object is to provide an apparatus of the class stated
20 which will produce a current of maximum power and efficiency and be extremely durable in construction.

The invention consists in certain peculiarities in the construction, arrangement, and
25 combination of the several parts of the apparatus, substantially as hereinafter described, and particularly pointed out in the subjoined claims.

In the accompanying drawings, illustrating the invention, Figure 1 is a sectional elevation of my improved apparatus connected with a boiler and pump, said apparatus being drawn to a larger scale than the boiler and pump. Fig. 2 is an enlarged horizontal section
30 through the apparatus; and Fig. 3 is a sectional view of one of the plates with its peripheral portion broken off. Fig. 4 is a detailed view of a modified form of plate.

The casing A, within which the water is freed from scale-producing impurities previously to its entrance into the boiler, is connected at one side with the pump B by the pipe b and at the other side with the lower end of the boiler C by the pipe c, (the end of which
45 latter preferably extends vertically within the casing A, so as to take the purified water from the upper part of the latter,) and is connected with the upper part of the boiler by the return-pipe c', said pipes having suitable valves,
50 wherever necessary, to control the passage of water through them. The casing is provided with a chamber A' in its bottom, into which

the mud and other heavy impurities of the water may settle, and said sediment-collecting chamber is provided with a blow-off cock a' and with a normally-covered hand-hole, (indicated at a²,) through which the sediment may be discharged and removed. The casing is further provided with cocks c³ in its upper end, through which oil may be discharged from the top of the casing when desired, and has a removable cap or cover A'' for affording access to its interior.

The construction thus far described is shown, described, and claimed in my pending application, Serial No. 530,410, filed November 30, 1894, and therefore is not claimed herein, and need not be more particularly described, and, furthermore, may be varied without affecting the spirit of the invention, which latter relates entirely to the means for producing galvanic action.

Within the casing are shown a plurality of plates or partitions D, which divide the casing into chambers and are formed of a metal, such as zinc, which when immersed in water and properly arranged with respect to another suitable metal, such as copper, that is also immersed in the water, produces a galvanic action that frees said water from scale-producing impurities. Each of these plates has a plurality of projecting knobs, which may be tubes d, as shown in Figs. 1 and 2, or made solid, as shown at d', Fig. 4. When made tubular, the water flows through them from one chamber into another in its passage through the casing. These knobs d are preferably formed integral with and consequently of the same metal as their respective plates. In the construction herein shown the other element of the battery is formed by a lining E of the interior of the casing and by the rings F F', which latter serve, also, to support the plates or partitions in their proper relative positions, one above another, and are removably engaged with the same. I prefer that the plates be of electropositive metal and the lining and rings of electro-negative metal. The tubes d are preferably arranged in staggered relationship, so that the water will flow in a circuitous course through the casing, which is of obvious advantage.

It will be observed that the plates are held

in such relative position by the rings that a water-space is provided above and below each one and that the knobs project from the surfaces of the plates into said water-spaces.

5 By this construction the device will have a maximum power and duration of usefulness and at the same time may be made very cheaply. The knobs when tubular preferably terminate out of contact with the plate
10 next adjacent to that from which they respectively project, so that the water may spread itself between the plates. When the knobs are tubular and arranged to cause the water to take a circuitous course, it is essential that one end of each be out of contact
15 with a plate, as is obvious, but when solid said knobs may engage a plate at each end.

From the above it will be seen that I have produced an apparatus for the purpose stated
20 which provides in a small compact structure a maximum amount of surface of metals capable of producing galvanic action, and that therefore the strength and power of the apparatus is materially increased, so that it
25 effectually eliminates the scale-producing elements from water rapidly forced through the casing. It will further be seen that plates or partitions constructed as above set forth have a prolonged period of usefulness,
30 as their construction is such as to enable them to withstand corrosive action for a maximum length of time. It will still further be seen that by supporting the pans upon removable rings and providing the casing
35 with a removable cap the elements of the battery may be quickly assembled and any of them readily removed when necessary or desirable.

While I herein describe the rings and plates
40 as being formed of relatively electropositive and electronegative metals, respectively, I wish it understood that the rings may be made of electronegative metal and the plates or partitions of a relatively electropositive
45 metal without departing from the spirit of my invention.

Having thus described my invention, what I claim is—

1. In an apparatus for purifying water by
50 galvanic action, the combination with the casing having inlet and outlet ports, and also having an interior lining forming one battery element, of a tube, forming a water conduit extending longitudinally within the casing
55 and opening near one end thereof, and a series of superimposed perforated plates forming the other battery element, each of said plates having an opening to fit over said tube and being provided with a series of projections,
60 substantially as described and for the purposes specified.

2. In an apparatus for purifying water by galvanic action, the combination with the

casing having inlet and outlet ports, and the tube extending longitudinally within said
65 casing and opening near one end thereof, of the perforated plates located one above another within said casing, each of said plates having an opening to fit over said tube and being provided with a series of projections,
70 and supporting rings alternating with said plates, said rings and plates being formed of relatively electro-positive and negative metals, substantially as described.

3. In an apparatus for purifying water by
75 galvanic action, the combination with the casing having inlet and outlet ports, the tube forming a water conduit extending longitudinally within the casing and opening near one end thereof, and the lining for the interior of
80 the casing, of the perforated plates located one above another within said casing, each of said plates having an opening through which said tube extends and being provided with projections, and supporting rings alternating
85 with said plates, said lining and rings and the plates being formed of relatively electro-positive and negative metals, substantially as described.

4. In an apparatus for purifying water, the
90 combination with the casing constructed to permit the ingress and egress of water, of plates arranged in said casing one above another, each of said plates having a series of tubular projections, said projections being arranged
95 in staggered relationship to give the water a circuitous course through the casing, and rings alternating with said plates and supporting the same, said rings, plates and projections being formed of relatively electro-
100 positive and negative metals, substantially as described.

5. In an apparatus for purifying water by galvanic action, the combination with the casing constructed to permit the ingress and
105 egress of water, of the series of perforated plates arranged horizontally within said casing one above another so as to leave water spaces between their adjacent surfaces, the supporting rings alternating with said plates
110 and encircling said water spaces, and a series of knobs, projecting from the surface of each plate into the adjacent water space to a place considerably below the plane of the top of the adjacent ring, each of said knobs being completely immersed in water, and said rings and
115 plates and knobs being formed of relatively electro-positive and negative metals, substantially as described.

In testimony whereof I affix my signature
120 in presence of two witnesses.

SAMUEL G. CABELL.

Witnesses:

CHAS. J. STOCKMAN,
H. K. SIMPSON.