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PATENTED FEB. 9, 1904.

O. KARTZMARK.  
APPARATUS FOR PURIFYING LIQUIDS.

APPLICATION FILED DEC. 26, 1900.

NO MODEL.

Fig. 2

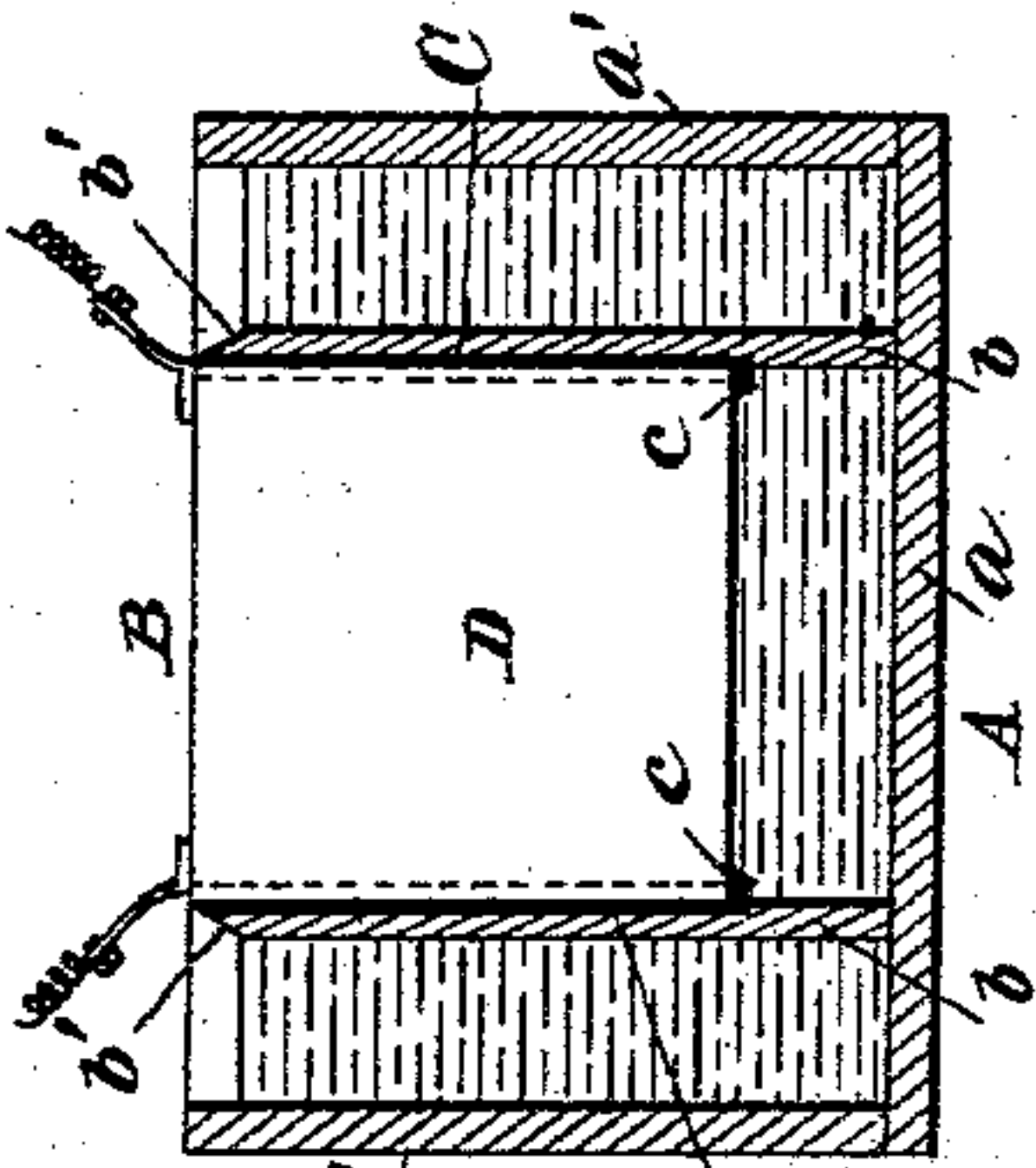


Fig. 1

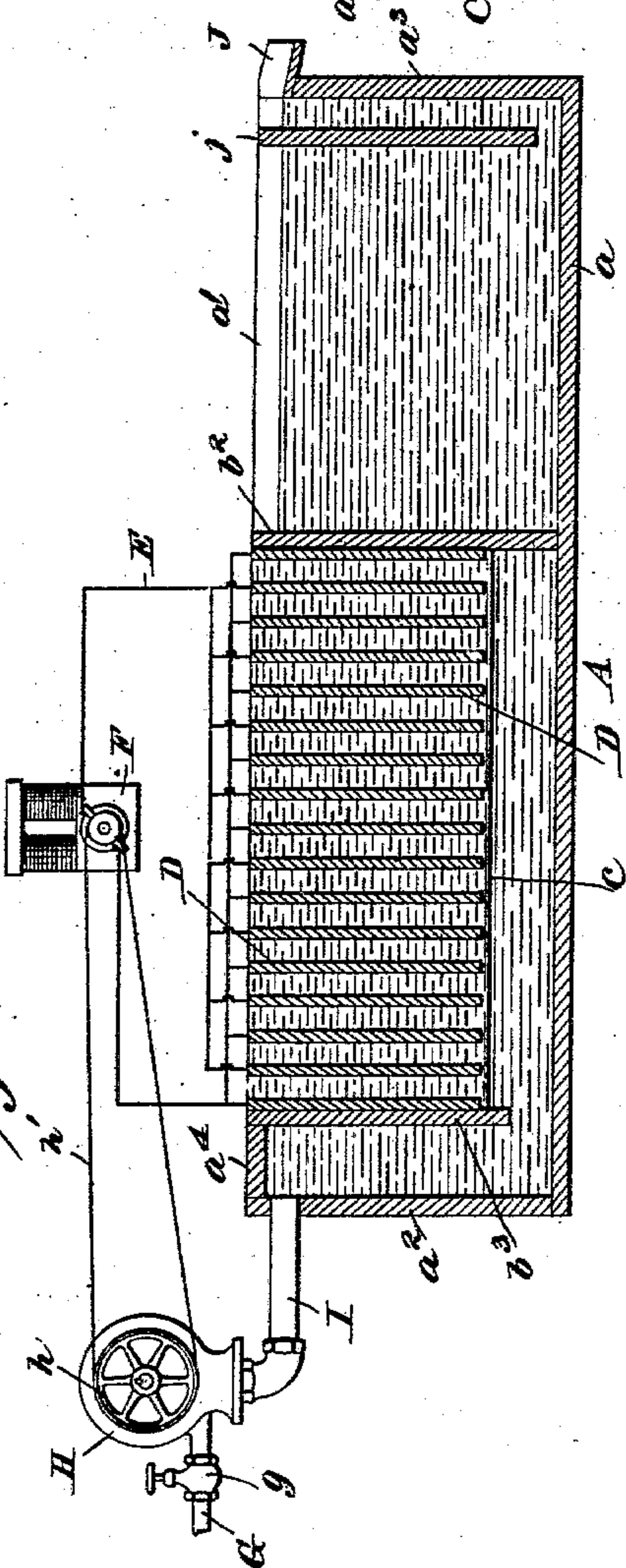
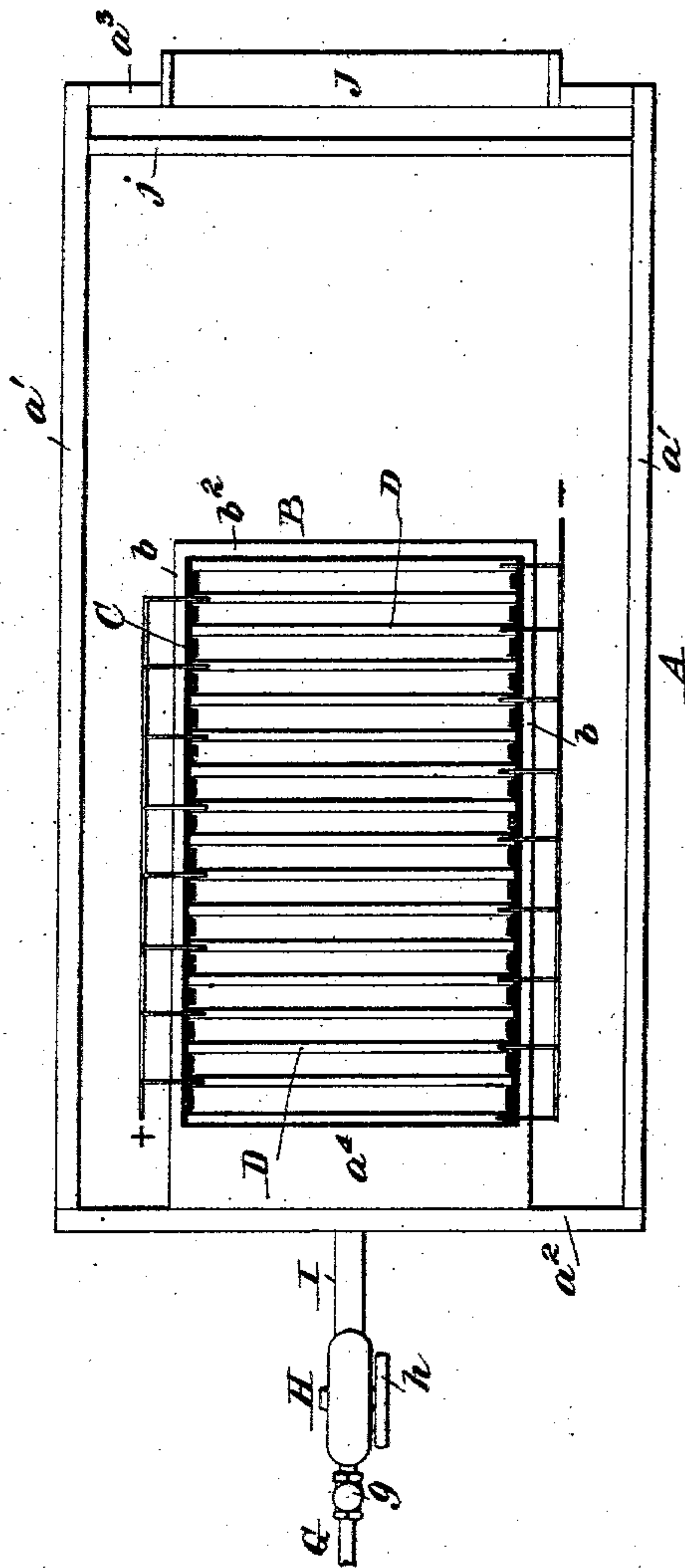


Fig. 3



Witnesses:

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Att'ys.



# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR PURIFYING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 751,986, dated February 9, 1904.

Application filed December 26, 1900. Serial No. 41,128. (No model.)

*To all whom it may concern:*

Be it known that I, OTTO KARTZMARK, a citizen of the United States, residing in the borough of Brooklyn, city of New York, State of New York, have invented a certain new and useful Apparatus for Purifying Liquids, of which the following is a description.

The present invention relates to that class of apparatus in which liquids are purified by process of electrolysis. In apparatus of this class heretofore employed a number of aluminium electrodes connected with a source of energy have been mounted in a suitable tank, the liquid being fed to these electrodes from one end of the series and permitted to pass successively between such electrodes to finally discharge in a settling-tank. In operation a purifying apparatus so constructed has been found to greatly lack capacity, due to large extent to the low speed at which the liquid passes through the series of electrodes.

The primary object of the present invention is to construct a purifying apparatus of large capacity—that is to say, one which will permit the handling of a great amount of water or other liquid for purification.

A further object of the invention is to decrease the cost of both installation and operation of such apparatus by employing the liquid acted upon to furnish the current with which the electrodes are supplied.

A further object is to make the purifying operation a continuous one from the time of the introduction of the liquid unpurified to the time of its discharge in purified condition.

I have illustrated and shall now proceed to describe a form in which the invention herein contemplated may be embodied, regarding the same as a preferred construction under that invention.

In the drawings, Figure 1 is a longitudinal section of a purifying-tank embodying the invention. Fig. 2 is a transverse section thereof taken between two of the electrodes, and Fig. 3 is a plan view of the apparatus shown in Fig. 1.

Referring to the drawings, in which similar letters denote corresponding parts, A designates a tank provided with the bottom  $a$ , sides

$a'$ , head end  $a^2$ , and tail end  $a^3$ . Into this tank is fed the liquid to be purified, which I shall here refer to as "water." Placed within the tank A in this embodiment of my invention is a supplementary tank B, consisting of side members  $b$ , (the upper edges of which are preferably beveled, as shown at  $b'$ ,) tail end  $b^2$ , and head end  $b^3$ . As illustrated in Fig. 1, the sides  $b$  and tail end  $b^2$  of this supplementary tank extend downwardly to the bottom of the tank A, the head end  $b^3$  ending a suitable distance above the bottom  $a$  of the tank A. The space between the head end  $b^3$  of the supplementary tank and the end  $a^2$  of the main tank is closed at the top at  $a^4$  to prevent the escape of the water introduced in that space. The interior of each of the sides  $b$  of the supplementary tank is here shown as protected by an insulating-lining C, channeled or grooved at suitable intervals to form guideways for the electrodes D. At a suitable distance above the bottom of the tank A a ledge or shelf  $c$  extends along the interior of each of the side members  $b$ , determining the proper depth of the electrodes.

The electrodes D are connected in multiple in a circuit E, communicating with a source of electrical energy, (here shown as consisting of a dynamo F,) said electrodes thus being of opposite polarity.

G designates the water-supply pipe, provided, preferably, with a valve  $g$ . This pipe communicates with a water-motor H, the water after passing therethrough being passed to the tank A by means of the pipe I. The motor H may be made of any desired character or type, provision being made for the transmission of power therefrom. In Figs. 1 and 2 I have shown the motor H as driving a pulley  $h$ , connected by means of a belt  $h'$  with the dynamo F.

J designates a spout or overflow at the tail end of the tank A, by means of which the water may be passed to the settling-tank, and in order that the water passing through this overflow shall be drawn not from the top of the water in the tank A, containing impurities of one sort or another, but from a point near the bottom and below such impurities I locate in



the tank A a partition *j*, which permits the water passing upwardly between the partition and the tail end of the tank to be drawn only from a point near the bottom of the tank A.

5 The operation of the apparatus above described will be readily understood. The apparatus being in the condition shown in the drawings, the valve *g* is opened and the water permitted to pass therethrough to the motor  
10 H, which actuating the dynamo through the medium of the pulley *h* and belt *h'* energizes the circuit in which the electrodes D are connected. After passing through the motor the water is led through the pipe I to the tank A  
15 and passed downwardly therein between the end *a*<sup>2</sup> thereof and the head end *b*<sup>3</sup> of the supplementary tank. Continued pressure, due to continued ingress of water, causes the water to pass upwardly and simultaneously through  
20 the electrodes D, which are preferably equidistant to assure unvarying resistance between them. After passing simultaneously upward through the electrodes the water escapes over the beveled sides *b* of the supplementary tank  
25 B and into the main tank A, whereupon by reason of the electrolytic treatment which it has undergone, resulting in the coagulation of the nitrogenous or animal matter and the deposition of alkaline earths, metallic com-  
30 pounds, &c., upon the cathodes, a large percentage of the impurities with which the water was originally contaminated will float on the surface and may be removed in any suitable manner. The water is then, as heretofore  
35 stated, fed to the settling-tank from a point lower than these impurities by reason of the partition *j*.

I desire it to be understood that I do not limit myself herein to the specific construction and arrangement of parts shown and described. To some features of the invention  
40 as herein shown, however, I attach importance—such, for instance, as the manner described of arranging and mounting the elec-

trodes, this including the means for maintain- 45 ing them in the proper relativity and also for permitting the ready withdrawal of the electrodes and equally ready substitution of others. I also attach importance to the utilization of the water to be purified for the pur- 50 pose of effecting the generation of the current for purifying that water.

By my invention I obtain maximum efficiency in water purification. By passing the water simultaneously between the electrodes 55 ample opportunity is given for the electrolytic action upon which the purification depends, and a very much larger body of water can be thus treated than has been possible with any electrical purifying apparatus heretofore developed. 60

What I claim is—

1. In liquid-purifying apparatus, a receptacle open at its upper portion to the air, a series of detachable electrodes located therein 65 and energized from a suitable source of power, and means for passing the whole of a liquid in a continuous stream simultaneously upwardly between said electrodes and over the edges of said receptacle, substantially as described. 70

2. In liquid-purifying apparatus, an overflow-tank, a receptacle located therein and the upper portion whereof is open to the air, a series of detachable electrodes supported within 75 the said receptacle upon stops located above the bottom thereof, and means for passing the whole of a liquid in a continuous stream simultaneously upwardly between said electrodes over the edges of said receptacle and 80 into said overflow-tank, substantially as described.

This specification signed and witnessed this 2d day of November, 1900.

OTTO KARTZMARK.

Witnesses:

J. O. EDMONDS,  
ARCHIBALD G. REESE.