(No Model.) 2 Sheets—Sheet 1.

T. CRANEY.

ELECTROLYTIC DIAPHRAGM.

No. 512,503. Patented Jan. 9, 1894.

Fig. 1.

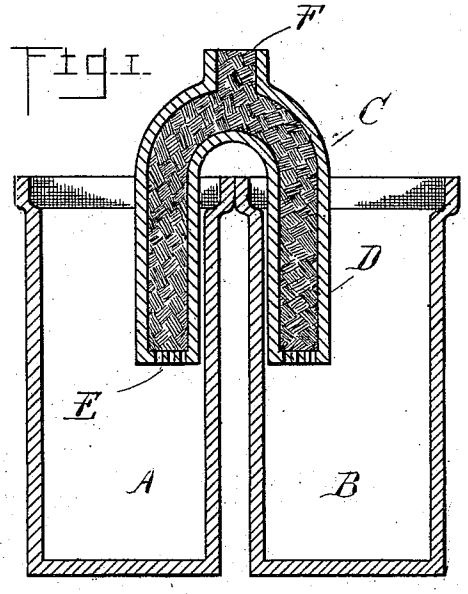
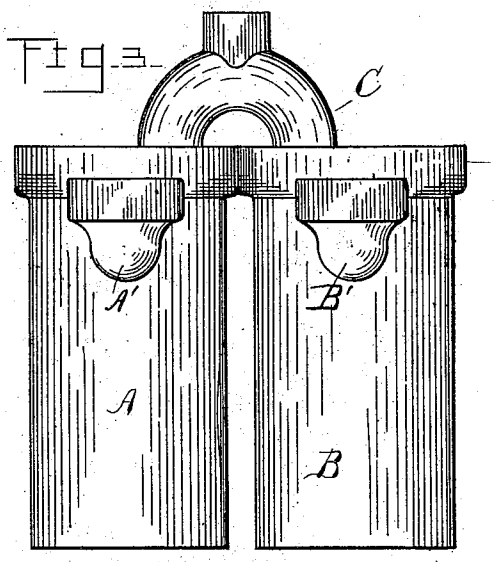


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

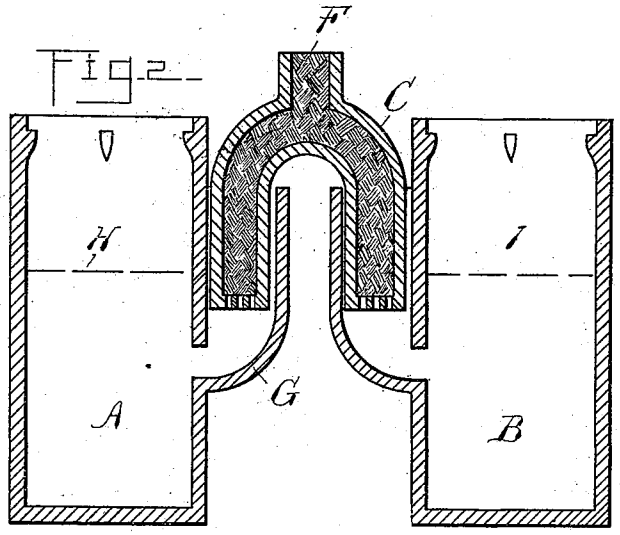
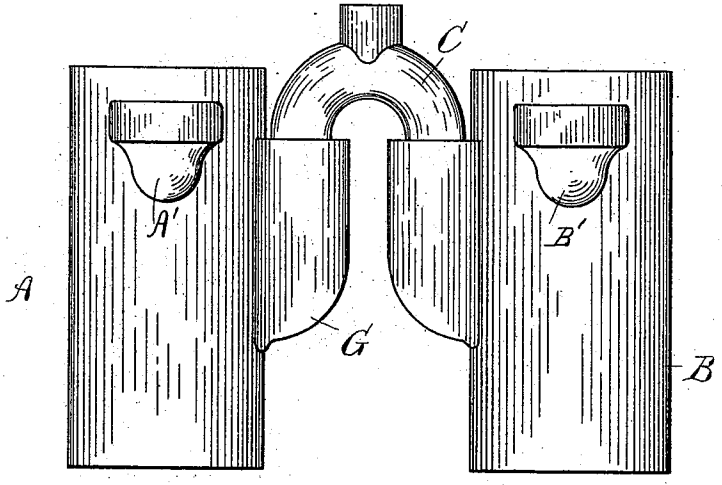


Fig. 4.



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UNITED STATES PATENT OFFICE.

THOMAS CRANEY, OF BAY CITY, MICHIGAN.

ELECTROLYTIC DIAPHRAGM.

SPECIFICATION forming part of Letters Patent No. 512,503, dated January 9, 1894.

Application filed September 26, 1892. Serial No. 446,925. (No model.)

To all whom it may concern:

Be it known that I, THOMAS CRANEY, a citizen of the United States, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Electrolytic Diaphragms, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention particularly refers to electrolytic diaphragms employed in the art of electrolyzing liquids, the object of which is to keep the liquids in the cathode and anode compartments from mixing with each other, as well as preventing the products of electrolysis from reuniting. The various electrolytic diaphragms which have been devised heretofore have the drawback of limiting the capacity of these compartments as they are more or less bulky and liable to become leaky, and the object of my invention is to construct and arrange a diaphragm which will but very little, or not at all, reduce the capacity of the chambers, while at the same time effectively preventing the formation of a leak between the compartments, and to this end, my invention consists in electrolytically connecting the cathode and anode compartments above the level of the liquid, preferably by the capillary action of the liquid through the porous material contained in a tube or casing, the open ends of which are immersed into the cathode and anode compartments respectively, or in lateral branches formed thereon, all as more fully hereinafter described and shown in the drawings, in which—

Figure 1 is a vertical, central section through anode and cathode compartments connected by an electrolytic diaphragm of my invention. Fig. 2 is a similar view with the parts modified. Figs. 3 and 4 are side elevations of Figs. 1 and 2 respectively.

A and B represent the anode and cathode compartments forming an electrolytic cell which are of known construction, and contain respectively the anode and cathode. (Not shown.)

The compartments or vessels A B are provided with lateral branches A′ B′ as shown in Figs. 3 and 4, suitable for filling in or discharging the liquid or for connecting the vessels in series.

C is an inverted U shaped tube or casing and D is porous material filled in said tube or casing. To fill the tube or casing and hold the material in place therein, I preferably restrict the open ends either by a perforated partition E or otherwise, and provide the top with an opening F, through which the material may be filled in and which may then be closed if desired. This casing or tube filled with a porous material forms the electrolytic diaphragm by immersing it into the liquid contained in the anode and cathode compartments respectively, as shown in Fig. 1, or by forming the anode and cathode compartments with lateral branches G which form sockets into which the ends of the tube or casing may be inserted and sealed with suitable cement. I preferably arrange these lateral branches as shown in Fig. 2, wherein they are shown to communicate with the compartments below the surface of the liquid in the compartments, which surface is indicated by the dotted lines marked H, and I also extend these branches to a sufficient height above the surface of the liquid to prevent any leak or overflow.

In practice the casing or tube of the electrolytic diaphragm may be formed of any non-conducting material suitable to withstand the electrolytic action, and which extends when in position above the height of the liquid in the compartments whereby the liquid in the two vessels is electrolytically united by the capillary action which takes place in the porous material, the latter being to this end of a suitable nature to permit such action to take place. As a porous material, asbestus, powdered glass, sand, &c., may be used, or any other non-conducting material which remains neutral under the electrolytic action and is adapted to permit the capillary action to take place and afford a suitable passage to the current. To support the porous material within the tube, I preferably close the ends of the tube and provide it with perforations.

It will be seen that an electrolytic diaphragm of this kind does not afford any opportunity for leakage as other diaphragms are liable to do, and furthermore, especially with

the construction shown in Fig. 2, the compartments are not at all obstructed with it. They also separate the liquids in the two compartments very effectively, as the material would have to traverse the whole length of the tube to pass from one compartment into the other.

The opening F in the top of the tube may be left open for the escape of any gases which may collect in the top and also for preventing the siphoning of the contents from one vessel into the other. In case the capillary action is not sufficiently strong, fluid may be fed through the opening F to connect the two compartments.

What I claim as my invention is—

In an electrolytic cell a tubular diaphragm consisting of an inverted U-shaped casing of non-porous material and provided with an aperture on top, perforated partitions closing the ends of the casing, and a porous medium contained in said casing, substantially as described.

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

THOMAS CRANEY.

Witnesses:
M. B. O'DOGHERTY,
N. L. LINDOP.