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APPARATUS FOR ELECTROCHEMICALLY AND MECHANICALLY PURIFYING LIQUIDS.

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Fig. 1.

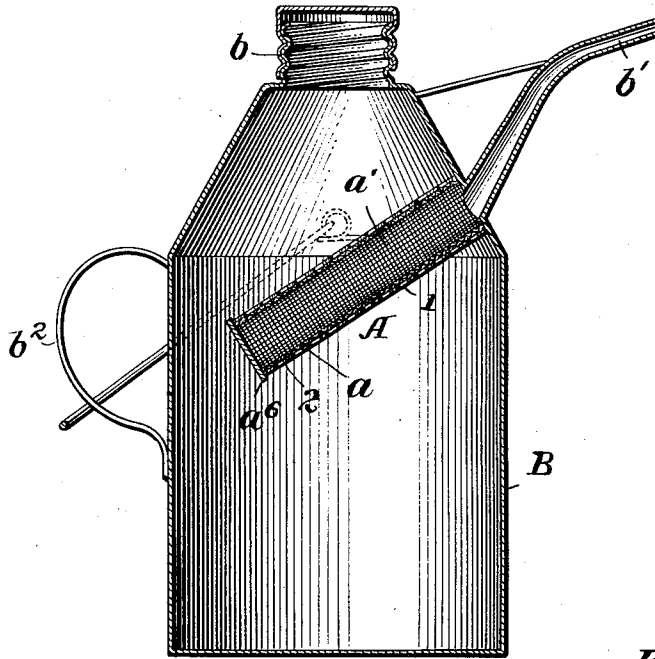


Fig. 5.

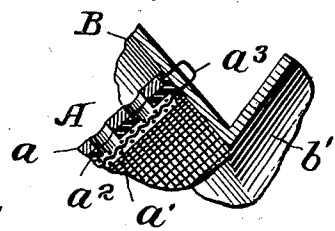


Fig. 2.

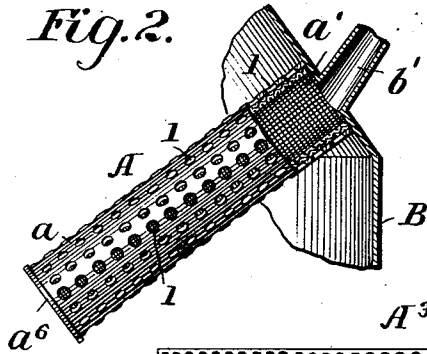
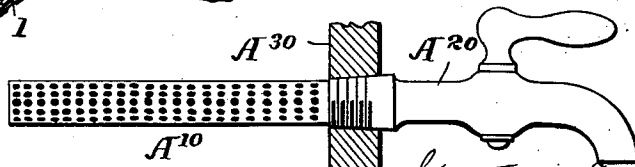


Fig. 3.



Fig. 4.



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# UNITED STATES PATENT OFFICE.

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APPARATUS FOR ELECTROCHEMICALLY AND MECHANICALLY PURIFYING LIQUIDS.

No. 856,361.

Specification of Letters Patent.

Patented June 11, 1907.

Application filed May 25, 1906. Serial No. 318,685.

*To all whom it may concern:*

Be it known that I, GUSTAVE L. NEIBURG, a citizen of the United States, residing at Westpoint, in the county of Cuming and State of Nebraska, have invented certain new and useful Improvements in Apparatus for Electrochemically and Mechanically Purifying Liquids; 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 and figures of reference marked thereon, which form a part of this specification.

This invention relates to certain improvements in the art of purifying liquid by electrolytic action and particularly to the means thereof wherein the liquid under treatment is electrolyzed and filtered or strained: and the invention consists in the novel apparatus hereinafter described and particularly set forth in the subjoined claims.

A principal object of the invention is to provide such improvements in the art of purifying liquids that, in a most simple and practical manner, and by a most simple and practical means, a liquid may by the same device be electrolytically freed of deleterious chemical impurities or constituents and mechanically freed of the mechanical impurities which may be suspended therein.

In other words, it is a principal object of the invention to provide an electrolytic couple or member of such construction that one or each of its elements will constitute a strainer, whereby the couple is not only adapted to electrolyze a liquid brought into contact therewith but will, further, strain from the liquid the mechanical impurities suspended therein.

A further object of the invention is to provide a means by which hydrocarbon oil, such as kerosene or gasolene, will be electrolytically separated from any acid constituents that may be therein.

A further object of the invention is to provide a means whereby a hydrocarbon oil will at once be electrolytically freed from any acid impurities that may be therein and mechanically separated from the mechanical impurities suspended therein.

In a general way it may be stated that the principal object of the present invention is to provide for the purification of a hydrocarbon oil while the same is being drawn for use from

a suitable container in which it is stored and particularly to provide a container of hydrocarbon oil with a purifying member adapted to free the oil of its acid constituents and of the mechanical impurities which are suspended in the oil, while the oil is flowing or being withdrawn from the container for use.

These several objects of the invention are well accomplished by the forms of the invention illustrated in the accompanying drawings, in which:—

Figure 1 is a longitudinal section through an oil can of one well known form, provided with a purifying member adapted to carry the present invention into practice. Fig. 2 is a detail view of a part of the same with the purifying member partly in section and partly in side view. Fig. 3 is a transverse section through the purifying member, on a line which cuts through a line of perforations in the outer element of the member. Fig. 4 is a detail view of a different kind of container provided with my improved purifier, and Fig. 5 is a detail view showing a connection of the elements of the purifying member with each other, which may be resorted to if necessary or advisable.

The same characters of reference designate the same parts in the several views.

In carrying the present invention into practice in its preferred form, a purifying member such as that indicated at A in each of the accompanying figures of the drawings comprising electro positive and electro negative elements, and so constructed as to break the liquid into a number of small particles so to speak, is placed in a suitable container of the liquid and in such position therein that the flowing liquid while being withdrawn from the container for use will be caused to pass into or through the purifying member in a number of small subdivisions, whereby the precipitation of its chemical impurities is accomplished or hastened by the electrolytic action of the purifying member while the mechanical impurities which are suspended in the liquid will be mechanically restrained from passing into or beyond the purifying member.

The breaking up of the liquid into small subdivisions as described is especially important in the treatment of oils such as kerosene. In such case the acid impurity deposited is probably sulfuric acid, which is deposited in the form of sulfate of zinc, when zinc is used, as it has been by me, as one

of the materials of the electrolytic couple. Such precipitation is hastened by the galvanic action, which is permitted to take place by the breaking of the oil up into a series of small subdivisions thus bringing approximately every particle of oil into intimate contact with the couple. In fact, all inflammable oils, such as kerosene and gasolene, contain an electrolyte in the form of some foreign substance which needs to be eliminated to cause the oil to give forth its greatest illuminating power. All oils of this nature contain sulfuric acid in a greater or less degree. Actual test shows that a device constructed in accordance with the present invention will attract and arrest this sulfuric acid in the form of sediment an inch or more thick, after using the same a comparatively short time. The elimination of this element from the oil is the principal object of my invention, whereby the use of a device constructed in accordance with the present invention will provide pure oil.

While it is not intended to restrict the invention in its broadest aspects to the particular detail construction of purifying member herein set forth, or to restrict the invention to the purification of any particular liquid, yet I desire to say that the most advantageous use of the present invention is in the freeing of inflammable oils, such as kerosene and gasolene, from acid and mechanical impurities, whereby the burning qualities of such oils are materially improved, and the invention will be most particularly described for such use.

In an ordinary or any suitable oil can B, having a filling opening *b*, a spout *b'* and a handle *b<sup>2</sup>*, I arrange the purifying member A, preferably in such position that the oil in its passage to the spout must pass through such member and in its passage therethrough will be broken up into relatively small divisions or parts so that approximately every particle of the oil being withdrawn from the container will be brought into contact with and be acted upon electrolytically by the purifying member.

The purifying member is composed of two elements *a* and *a'*, made of electro positive and negative materials, such as zinc and copper, and constituting an electrolytic couple. Each of such elements is reticulated, or formed with a number of apertures 1 and 2, respectively, through which the liquid flows. In the best form of the purifying member, each of its elements is tubular and one, for example, the copper element *a'*, is located within the other and is composed of a cloth of copper wire of fine mesh, adapted to act as an efficient strainer for mechanical impurities, while the outer, zinc, element has its apertures 1 more widely separated and of larger size than those of the copper element.

The tubular couple A is preferably arranged

with its interior in communication with the interior of the spout *b'*, so as to form practically a continuation of the spout within the can or container, and its end contiguous to the inlet to said spout is open while its opposite end is closed by a cap or plate *a<sup>6</sup>*, preferably of copper or material of like character. It will thus be apparent that when the can is tilted in the ordinary way, in pouring out its contents, the oil will in its passage therefrom flow into the tubular purifying member, through the lateral openings therein and will thereby be electrochemically freed of any acid constituents, such as sulfuric acid, which may remain in the oil from the ordinary oil purifying process, and also be mechanically freed of the suspended mechanical impurities.

In Fig. 4, I have shown a purifying member A<sup>10</sup> of the form shown in Figs. 1, 2 and 3, applied to a faucet A<sup>20</sup> which may be permanently fixed to a barrel A<sup>30</sup> or other like oil-container, or removable from such barrel or container. If deemed necessary or expedient, the two elements of the purifying member may be separated from each other by means of suitable insulation, as indicated at *a<sup>2</sup>* in Fig. 5 and connected by a wire *a<sup>3</sup>* arranged outside the container or otherwise protected from contact with the liquid to be purified.

From the foregoing the steps of the process and the construction, operation and advantages of the device illustrated will be readily understood, and it will be apparent that the invention, in its broad aspect is not restricted to the form of device illustrated. It will be further apparent that the detail form of device illustrated has such peculiar advantages that it is made the subject matter of claims more and less restricted thereto.

Having thus described the invention what I believe to be new and desire to secure by Letters Patent, and what I, therefore, claim, is:—

1. A liquid purifying means comprising an electrolytic device and strainer composed of two tubular members located one within the other and one of which is formed of zinc, each of said members having perforations leading to the interior of the electrolytic device to thereby adapt said device to break the liquid up into a series of small subdivisions.

2. In a device of the character described, the combination with a receptacle provided with an outlet aperture, of an electrolyte purifying device arranged in the path of the liquid flowing to said aperture, said purifying device comprising an outer, perforated, zinc element, a copper wire-mesh element positioned within said outer element, insulating means between said outer and inner elements, and means positioned outside of said receptacle and electrically connecting said elements.

3. In a device of the character described, the combination with a receptacle provided with an outlet aperture, of an electrolyte purifying device arranged in the path of the liquid flowing to said aperture, said purifying device comprising a tubular, apertured zinc element, a tubular copper element formed of wire-mesh and positioned within said zinc element, a wire positioned outside of said elements, and means insulating said elements from each other.

4. In a device of the character described, the combination with a receptacle provided with an outlet aperture, of an electrolyte purifying device positioned within said receptacle and arranged in the path of the liquid flowing to said aperture, said purifying

device comprising a hollow, tubular zinc element, a copper wire-mesh, tubular element positioned within said zinc element and arranged across the apertures thereof.

5. An electrolyte purifying device, comprising an outer zinc tubular element, an inner copper element, each element provided with apertures, the apertures of the copper element smaller than the apertures of the zinc element, and said purifying device adapted to break the liquid up into a series of small sub-divisions.

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

GUSTAVE L. NEIBURG.

Witnesses:

JOHN H. LINDALE,  
C. W. ACKERMAN.