J. D. PHILLIPS & C. HAMBUECHEN.

METHOD OF CLEANING METAL ARTICLES.

APPLICATION FILED AUG. 6, 1909.

945,865. Patented Jan. 11, 1910.

Fig. 1.

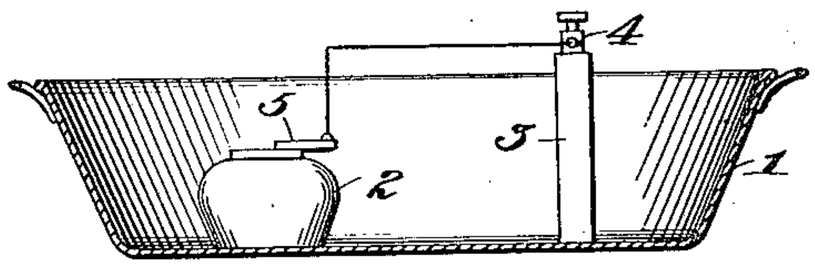


Fig. 4.

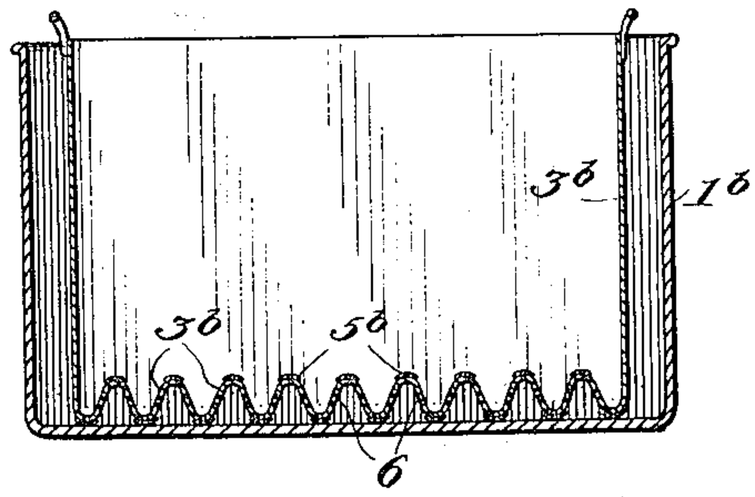


Fig. 2.

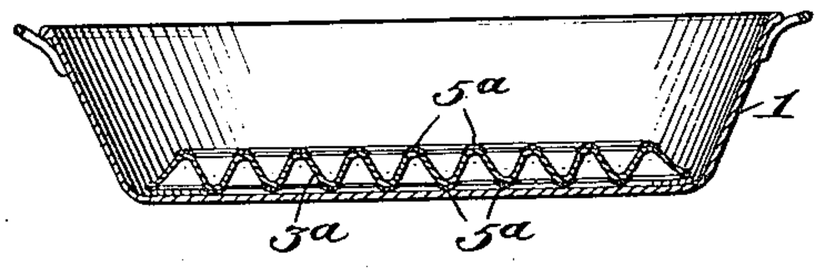


Fig. 3.

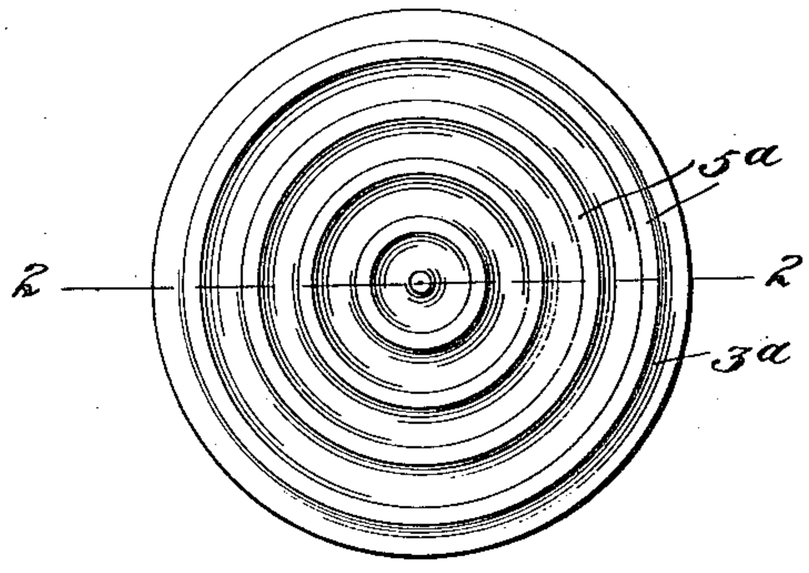
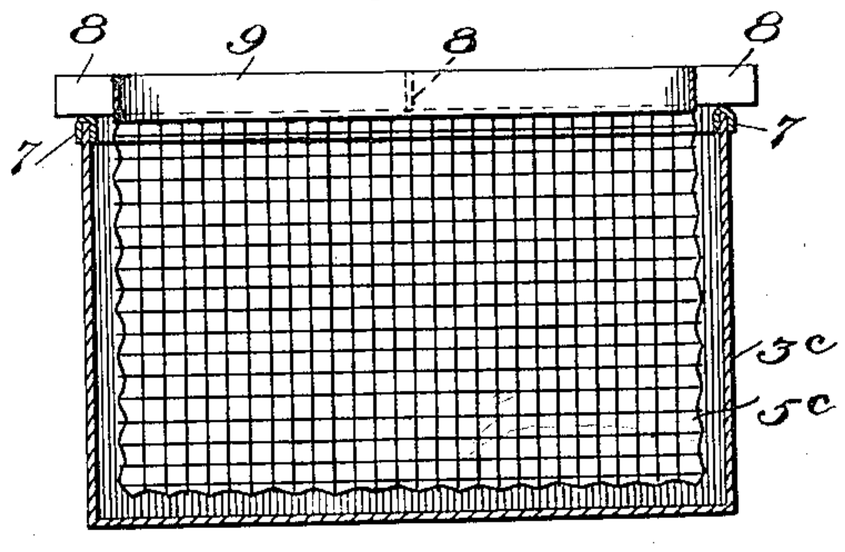


Fig. 5.



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UNITED STATES PATENT OFFICE.

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METHOD OF CLEANING METAL ARTICLES.

945,865. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed August 6, 1909. Serial No. 511,540.

To all whom it may concern:

Be it known that we, JAMES D. PHILLIPS and CARL HAMBUECHEN, citizens of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Methods of Cleaning Metal Articles, of which the following is a specification.

This invention relates to the cleaning of tarnished metallic surfaces, the object of the invention being the provision of a method whereby silver, gold and other metallic articles may be quickly and effectively cleaned preparatory to polishing.

It has been heretofore proposed (British patent No. 7027 of 1905 to Ransford) to clean silver articles by immersing them in a hot alkaline solution in a tin-lined vessel, whereby the silver becomes the cathode of a voltaic couple, and the coating or tarnish is electrolytically reduced and rendered easy of removal. It has also been proposed to use instead of tin-lined vessels, dishes of aluminum, or metallic plates or baskets as anodes. It is found in practice that such metallic anodes become coated after a short period of use with a film or coating which is difficult to remove, and which prevents effective electrical contact between the article to be cleaned and the electropositive metal, as tin or aluminum. According to the present invention the efficiency of the cleaning operation is maintained by the provision of means whereby effective electrical connection is at all times secured between the electropositive metal, as zinc, aluminum or tin, hereafter referred to as the "cleaning metal", and the silver or other article to be cleaned. We have found as the result of numerous experiments that the coating or film formed upon the cleaning metal is porous in character and does not seriously interfere with the electrolytic action, provided effective electrical connection is secured between the cleaning metal and the metal to be cleaned: the film does however prevent such contact, and our invention resides in the provision of a method whereby this defect may be overcome.

For a full understanding of the invention reference is made to the accompanying drawing illustrating certain applications of our method.

In said drawing: Figure 1 is a vertical central section illustrating the principle of the invention; Fig. 2 is a similar view on line 2—2 of Fig. 3; Fig. 3 is a plan view of the apparatus shown in Fig. 2; and Figs. 4, 5, are vertical sectional views of modified types of apparatus.

If an electropositive metal, as for example zinc, be maintained in effective electrical contact with a metal or alloy electronegative thereto, as for example, tin, silver, solder, etc., the latter metal or alloy will remain bright, and may be used to secure an effective electrical contact with the article to be cleaned. This metal or alloy through which the contact is made between the metal to be cleaned and the cleaning metal will be termed for convenience the "auxiliary" metal. The auxiliary metal may be the same as the metal to be cleaned, or electropositive or electronegative thereto, it being essential merely that it be electronegative to the cleaning metal. Preferably, however, the auxiliary metal is intermediate in solution tension between the cleaning metal and the metal to be cleaned.

Referring to Fig 1, 1 represents a vessel which may be of enameled ware; 2 is the article to be cleaned, for example a silver dish; 3 is the cleaning metal, consisting in this case of a zinc rod having a terminal 4; 5 is the auxiliary metal which may be of tin, lead, silver, etc.; and 6 is a wire establishing contact between the cleaning and auxiliary metals. If now an alkaline solution, as for example a solution prepared by dissolving one tablespoonful of baking soda and one-half tablespoonful of common salt in one quart of water, be poured into the vessel 1, an electrolytic action will be set up by which the cleaning metal 3 will tend to pass into solution, the auxiliary metal 5 being kept bright and therefore making effective electrical contact with the article 2, which will be quickly cleaned. The cleaning metal 3 will become coated with the porous film, as above described, but the arrangement is such that this film in no way

impairs the electrical contact with the article to be cleaned, and it is found in practice that the operation may be continued for long periods without substantial loss of efficiency. The solution is preferably but not necessarily heated.

In the above example the contact between the cleaning and auxiliary metals is made outside the solution, and is of a temporary character, but this is not essential. The disposition of parts may be varied almost indefinitely, and in the drawing it has been attempted only to show by way of example a few effective embodiments of the principle above illustrated.

In Figs. 2 and 3, 1 represents a vessel which may be of tin, enameled ware, or other material, and 3^a a corrugated or ribbed disk or sheet of an electropositive metal, as zinc or aluminum, lying loosely in the bottom of the vessel 1. The upper portions of the ridges or corrugations are tinned or soldered as indicated at 5^a, this tin or solder constituting the auxiliary metal, and remaining bright and in condition to make effective electrical contact with tarnished metal articles placed in the vessel 1. If desired the lower portions of the corrugations may also be tinned or soldered as shown, thereby not only making the plate reversible, but in case the vessel 1 is of tin, establishing good contact between it and the cleaning metal, and thereby extending the effective surface by which contact may be made with the article to be cleaned; for the vessel itself acts in this case as an auxiliary metal. Solder is advantageously used as the auxiliary metal, as it is not readily coated, and any coating formed is non-adherent and readily removed.

A device of larger capacity and suited for hotels or restaurants is shown in Fig. 4, in which 1^b is a vessel which may be of tin, granite ware, etc., and 3^b a zinc vessel fitting loosely therein and having a corrugated bottom, which may if desired be separable from the vessel to facilitate cleaning. The ridges projecting into the vessel 3^b are soldered as indicated at 5^b, providing a bright contact with silver or other articles to be cleaned; solder may also be applied to the lower faces of the ridges but this is not essential. The corrugated bottom is preferably perforated as indicated at 6 to permit the solution to drain away when it is lifted.

Another apparatus of large effective area is shown in Fig. 5 in which 3^c is a zinc vessel in which a basket 5^c of tinned or nickel plated wire is supported, the vessel and basket being in good electrical contact. As shown, such contact is secured by attaching to a tin strip or band 9 encircling the basket, several vertically disposed tin projections 8, the lower edges of which rest upon a tin rim or bead 7, folded over the upper edge of the zinc vessel 3^c or otherwise attached thereto. The contact between the bead 7 and the projections 8 is certain, more particularly when the weight of the silver is added to that of the basket.

It will be observed that in the embodiments of the invention illustrated in Figs. 2–5, inclusive, the auxiliary metal presents curved or projecting surfaces at its points or parts of contact with the article to be cleaned, this resulting in a diminished area of contact, and, it is found, an improved efficiency of contact, the points, lines or surfaces of contact being kept bright and clean by friction. The results above described are also attainable, although less perfectly, by the use of mixed metals or alloys, as for example an alloy of zinc with about 5% of tin; other alloys of zinc and tin, or alloys of aluminum with zinc and of zinc with lead have also been used. The electronegative metal seems in such cases to act as an auxiliary metal to facilitate the cleansing operation and to maintain the efficiency of the cleaning metal.

We claim:—

1. The method of cleaning tarnished metal articles, which consists in immersing the same in a suitable electrolyte in conjunction with a cleaning metal electropositive thereto, and providing electrical contact between the articles to be cleaned and the cleaning metal through an auxiliary metal electronegative to said cleaning metal.

2. The method of cleaning tarnished metal articles, which consists in immersing the same in an alkaline electrolyte in conjunction with a cleaning metal electropositive thereto, and providing electrical contact between the articles to be cleaned and the cleaning metal through an auxiliary metal electronegative to said cleaning metal.

3. The method of cleaning tarnished metal articles, which consists in immersing the same in a solution containing an alkali metal carbonate and chlorid in conjunction with a cleaning metal electropositive thereto, and providing electrical contact between the articles to be cleaned and the cleaning metal through an auxiliary metal electronegative to said cleaning metal.

4. The method of cleaning tarnished metal articles, which consists in immersing the same in an alkaline electrolyte in conjunction with zinc, and providing electrical contact between the articles to be cleaned and the zinc through an auxiliary metal electronegative to zinc.

5. The method of cleaning tarnished metal articles, which consists in immersing the same in a suitable electrolyte in conjunction with zinc, and providing electrical contact between the articles to be cleaned and

the zinc through an auxiliary metal electronegative to zinc but electropositive to the metal to be cleaned.

6. The method of cleaning tarnished metal articles, which consists in immersing the same in a suitable electrolyte in conjunction with a cleaning metal electropositive thereto, and providing electrical contact between the articles to be cleaned and the cleaning metal through an auxiliary metal intermediate in solution tension between the cleaning metal and the metal to be cleaned.

In testimony whereof, we affix our signatures in presence of two witnesses.

JAMES D. PHILLIPS.
CARL HAMBUECHEN.

Witnesses:
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ALICE B. CRONIN.