

945,866.

2 SHEETS—SHEET 1.

A diagram of a circular structure, possibly a cross-section of a dome or a similar architectural element. The structure is defined by a circular boundary. Inside, there are several vertical lines and two horizontal lines. The vertical lines are labeled with 'g' at the top and 'a' at the bottom. The horizontal lines are labeled with 'f' on the left and 's' on the right. There are also small circles at the top and bottom of the vertical lines, labeled 'e' and 'f' respectively.

A diagram of a mechanical device, possibly a pump or valve. It features a horizontal pipe with a vertical section on the left. Labels 'f' and 'g' are at the bottom, 'c' is on the right side of the horizontal pipe, and 'd' is at the top right end of the pipe.

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 APPARATUS FOR CLEANING METAL ARTICLES.
 APPLICATION FILED AUG. 5, 1909.

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2 SHEETS—SHEET 2.

Fig. 6.

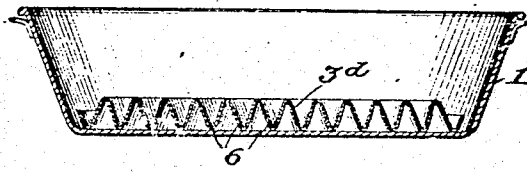


Fig. 7.

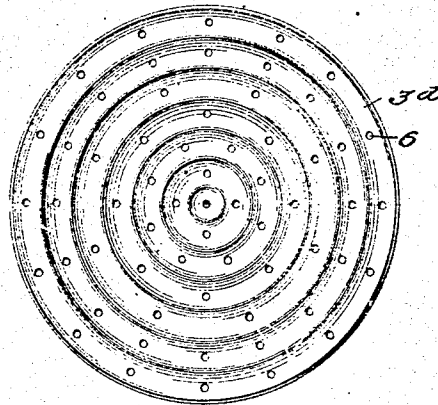


Fig. 10.

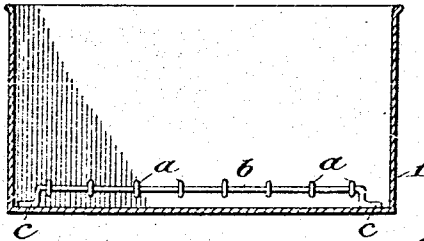


Fig. 8.

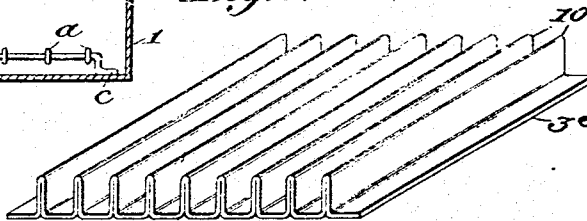


Fig. 11.

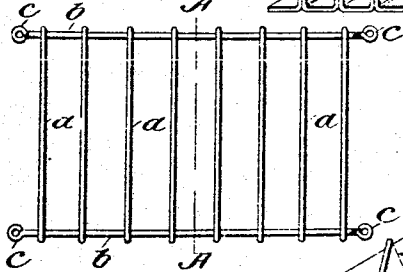


Fig. 9.

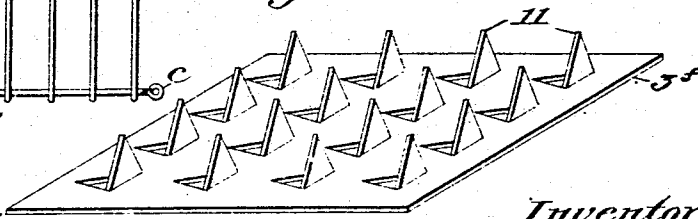
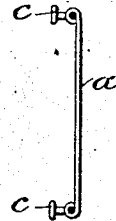


Fig. 12.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR CLEANING METAL ARTICLES.

945,866.

Specification of Letters Patent.

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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 Apparatus for Cleaning Metal Articles, of which the following is a specification.

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

15 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 25 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 cleansing operation is maintained by the provision of 35 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 articles to be cleaned.

40 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 45 cleaning metal and the metal to be cleaned: the film does however prevent such contact, and our invention resides in the provision of means whereby this defect may be overcome.

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

55 In said drawings:—Figure 1 is a vertical

central section illustrating the principle of one embodiment 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; Figs. 4, 5, are vertical sectional 60 views of modified types of apparatus; Fig. 6 is a vertical sectional view of a vessel containing a corrugated or ribbed sheet of electropositive metal; Fig. 7 is a plan view of the sheet shown in Fig. 6; Figs. 8, 9 are 65 modified forms of the electropositive metal; Fig. 10 is a vertical sectional view of a modified form of apparatus; Figs. 11 and 12 being plan and end views of a supporting frame; and Figs. 13 and 14 are a plan and partial 70 end view of still another modified form of frame.

If an electropositive metal, as for example zinc, be maintained in effective electrical contact with a metal or alloy electronegative 75 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 80 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 electro- 85 negative thereto, it being essential merely that it be electronegative to the cleaning metal.

Referring to Fig. 1, 1 represents a vessel which may be of enameled ware; 2 is the 90 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 95 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 100 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 elec- 105 trical 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 elec- 110

trical 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 position 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 plates 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.

By giving a proper form to the cleaning metal, or by providing it with points, edges, curved surfaces or like projecting portions adapted to make contact with the articles to be cleaned, it is quite possible to maintain the efficiency of the apparatus without the use of an auxiliary metal as above described, the porous film being more or less readily removed from such convex or projecting surfaces. In many cases such projecting portions will be kept sufficiently bright by the friction or abrasion of the articles to be cleaned or by that incidental to use, and in all cases such projecting portions are cleaned with ease as compared with the plane surfaces heretofore used by simply wiping or rubbing them. For example Figs. 6, 7 show a circularly corrugated plate 3^d of zinc or other electropositive cleaning metal, perforated at 6 to facilitate draining, and adapted for use in conjunction with a dishpan or like vessel 1. The upper convex surfaces or ridges are abraded and kept bright in use by the friction of the articles to be cleaned. In Fig. 8 a similar result is secured by the provision of transverse ribs or closed corrugations 10 projecting upwardly from the zinc or aluminum sheet 3^d; and in the construction of Fig. 9 points 11 are provided by stamping the sheet 3^d of electropositive metal in the manner indicated. Obviously the construction may be varied almost indefinitely, it being essential merely in this embodiment of the invention to provide portions projecting from the electropositive or cleaning metal, adapted to be kept bright and free from coating and thereby to make effective electrical contact with the articles to be cleaned.

Figs. 10, 11 and 12 show still another modified form of apparatus in which there is located in the containing vessel a frame

formed of tinned or nickel-plated wires *a, b*. The wires *b* form the sides of the frame and are provided with loops *c* for the purpose of receiving the solder securing the frame to the bottom of the vessel. The cross bars *a* form projections on which the articles to be cleaned may rest.

Figs. 13 and 14 show a circular form of frame made of tinned or nickel-plated wire, the outer rim *e* having projecting feet *f* into which the securing solder can be dropped. Transversely arranged cross wires *d* and *g* form suitable supporting members for the articles to be cleaned, and are looped around the rim wire *e* to brace the frame together.

We claim:

1. Apparatus for cleaning tarnished metal articles comprising a cleaning metal electropositive to the articles to be cleaned and provided with projecting portions presenting clean surfaces for making contact with said articles.

2. Apparatus for cleaning tarnished metal articles comprising a cleaning metal electro-

positive to the articles to be cleaned and provided with ribs or corrugations presenting clean surfaces for making contact with said articles.

3. Apparatus for cleaning tarnished metal articles comprising a cleaning metal electropositive to the articles to be cleaned and provided with projecting portions adapted to make contact with said articles, said projecting portions having a metallic surface electronegative to said cleaning metal.

4. Apparatus for cleaning tarnished metal articles comprising a ribbed or corrugated plate of a metal electropositive to the article to be cleaned, the convex surfaces of the corrugations having a coating of an electronegative metal.

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

JAMES D. PHILLIPS,
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Witnesses:

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