July 23, 1935. O. G. SMIDEL 2,009,278

PROCESS FOR TREATING METALS TO PREVENT SPOTTING OUT

Filed Dec. 9, 1931

Fig. 1

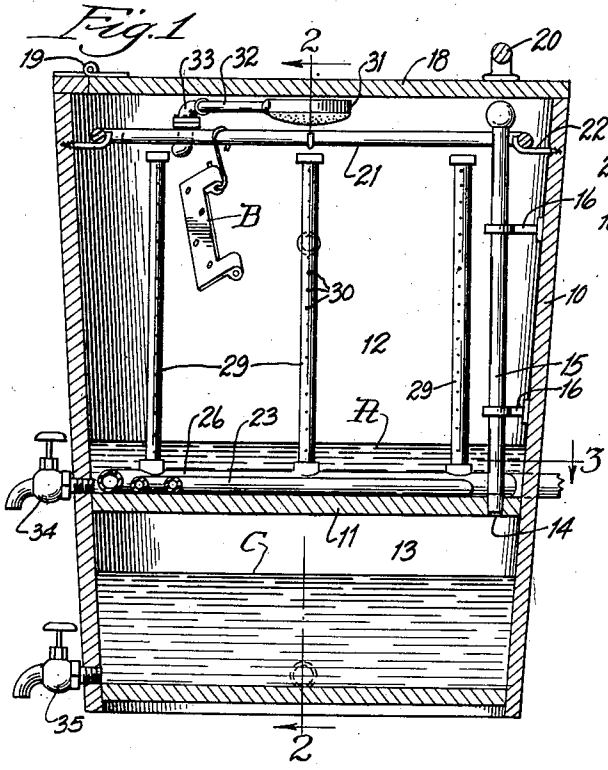


Fig. 2

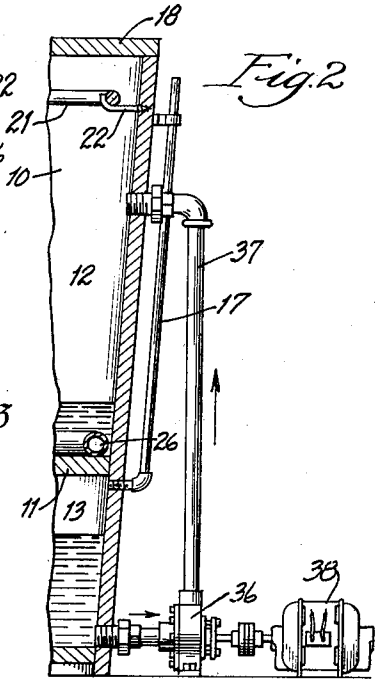


Fig. 3

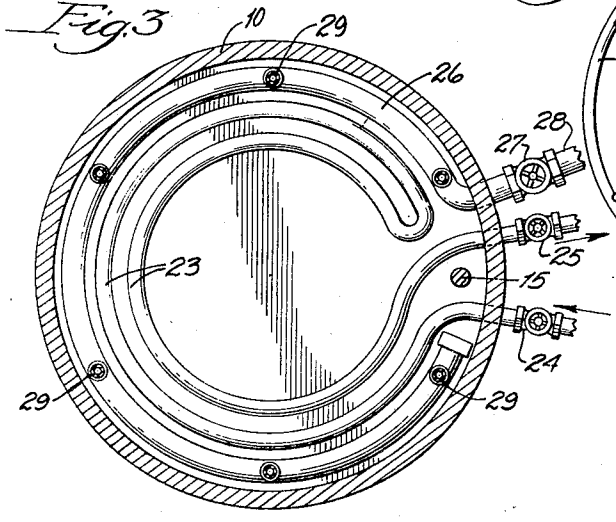
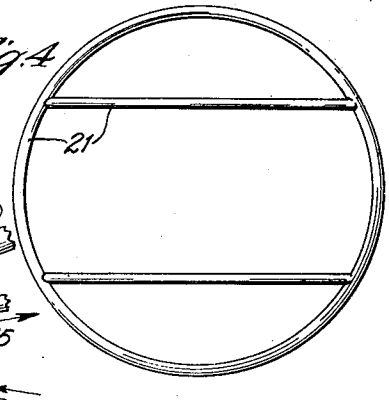


Fig. 4



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PROCESS FOR TREATING METALS TO PREVENT SPOTTING OUT

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10 Claims. (Cl. 148—8)

Heretofore in the plating or treating of metals, such as gray iron castings, malleable castings, sheet metal, white metal, zinc, bronze, and the like, there has been a strong tendency to produce spotting known to the trade as "spotting out" due probably to the inclusion of certain substances in the pores of the metal from the cyanide or other alkaline solution used during the plating, dipping, or other treating of the metal. This spotting appears some hours, days or weeks after treatment, and is worse in hot, humid weather.

An object of this invention is to provide a method of and apparatus for prevention of this spotting out.

This and other objects, as will hereinafter appear, are accomplished by this invention which is fully described in the following specification and shown in the accompanying drawing, in which—

Figure 1 is a vertical section through the apparatus embodying the invention;

Fig. 2 is a partial similar section on the line 2—2 of Fig. 1;

Fig. 3 is a horizontal section on the line 3 of Fig. 1; and

Fig. 4 is a front elevation of a rack for this apparatus.

The embodiment illustrated comprises a suitable receptacle 10 having a tight central partition 11 dividing the receptacle into upper and lower compartments 12 and 13, respectively. The partition 11 is provided with an opening 14 which is normally closed by means of a plug 15 which is carried in suitable guides 16, and extends near the top part of the upper compartment 12 so that the plug may be raised and lowered so as to open communication between the two compartments. The lower compartment is provided with a vent 17 to the atmosphere at a point near the top of the upper compartment.

The upper compartment is covered by means of a lid 18 which is hinged at 19 and provided with a handle 20. This lid is free to swing so as to substantially completely uncover the top compartment, in the top of which is suspended a suitable rack 21 by means of screws 22, or the like. A heating coil 23 is located near the bottom of the compartment 12, and this is supplied with steam from a boiler, (not shown) the admission of steam being controlled by means of valves 24 and 25. Thus a liquid as A in the bottom of the upper compartment can be heated to the point of vaporization so that its vapors will permeate the space throughout the upper compartment.

A water pipe 26 is also provided and this is connected through a valve 27 and pipe 28 to a suitable source of cold water supply. The pipe 26 carries a series of vertical risers 29, each of which is provided with a series of holes 30 so as to spray water throughout the upper compartment. A central spray device 31 is also connected through a pipe 32 and swivel connection 33 with a suitable source of cold water supply. Drain cocks 34, 35 are provided at the bottom of the upper and lower compartments respectively, so that the contents of either one may be drained off. A pump 36 is also connected into the bottom of the lower compartment, the delivery from the pump being through a pipe 37 to the upper compartment. A motor 38 serves to drive the pump 36. The operation of this apparatus is as follows:

A number of metal pieces as B to be finished are suspended from the rack 21, while a suitable treating agent C, which will hereinafter be described, is placed in the bottom compartment, and the motor 37 started so as to pump some of this liquid up into the upper compartment until it assumes some such level as that of A (Fig. 1), the opening 14 being closed. The cover 18 then being shut, steam is admitted through the valve 24 while the valve 25 is left slightly open. This will cause the treating fluid A to be vaporized and the vapors will surround the metal pieces B which are being treated, and these metal pieces have preferably been removed from the plating bath but recently, and have not been polished or finished except perhaps in a very superficial way.

After this steam has been on long enough to bring the liquid A substantially to a slow boil so that vaporization in considerable quantities has taken place, the valve 24 is closed and the valve 25 opened so as to permit the steam to pass out of the coil 23. The cover is then opened, the plug 15 lifted, so as to uncover the opening 14, and the liquid in the upper compartment then flows by gravity into the lower compartment. As soon as this is completed the plug 15 is replaced so as to close the opening 14, and cold water is then admitted to the upper compartment by opening the valve 27, thus admitting water through the holes 30 and spray 31. This water collects in the bottom of the upper compartment and is passed off to a drain through the drain cock 34. When this is accomplished this drain cock is closed, some of the liquid from the lower compartment is pumped back into the upper compartment, and this is then heated as before by the admission of steam.

Thus it will be seen that the metal pieces B to be treated are alternately heated and chilled, the

heating particularly being done in the fumes of a treating agent. Even without this treating agent, however, this alternate heating and chilling of these pieces in the presence of water vapor will aid materially in dissolving out of the pores of pieces some of the cyanide or other alkaline solutions or spotting material which entered during the plating operation, or otherwise. This action, however, is greatly expedited by the use of a suitable treating agent, which will now be described.

I have found in practice that a treating agent consisting of one gallon of lemon juice, as squeezed from lemons, when mixed with ten gallons of water and eight to sixteen ounces of glycerine makes a very satisfactory treating agent when used as above described. It will operate with a fair degree of success without the glycerine, but the addition of the glycerine makes its operation more quick and certain. If desired, concentrated lemon juice may be used. This is usually concentrated so as to occupy about one-sixth its previous volume, and when mixed with water only about one-sixth as much of it is used as stated above for the plain lemon juice. Citric acid may also be used for this purpose in proportions to make about the same strength of solution. With the addition of coffee or caffeine to the above mixture also increases the penetrating and neutralizing effects. For this purpose one or two ounces of caffeine should be added to the above mixture.

The above mixture is non-injurious to the finishes, and the vapors of these substances when hot penetrate the pores of the metal pieces to be finished, and dissolve out the substances which would otherwise cause spotting out. This is greatly aided by alternately heating and cooling the metal piece which probably produces unequal expansion, and thereby permits these substances to penetrate into the pores of the metal. This processing is best done immediately after plating, and before polishing, coloring, finishing, or lacquering. A very distinct advantage of this unit resides in the fact that the hot liquid A, when drained into the lower compartment, remains hot, and time is thus saved when this liquid is returned to the upper compartment.

While I have shown and described but a few embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made which do not depart from the spirit and scope of the invention as disclosed in the appended claims.

I claim:

1. The method of treating plated metal pieces of the class described prior to lacquering to prevent spotting out, comprising alternately heating and chilling the metal pieces before lacquering in the presence of water vapor.

2. The method of treating plated metal pieces of the class described prior to lacquering to prevent spotting out, comprising alternately heating and chilling the metal pieces before lacquering in the presence of water vapor, and vapors of a compound from the class of citric acid and lemon juice.

3. The method of treating plated metal pieces of the class described prior to lacquering to prevent spotting out, comprising alternately heating and chilling the metal pieces before lacquering in the presence of water vapor, of citric acid, and of caffeine.

4. The method of treating plated metal pieces of the class described prior to lacquering to prevent spotting out, comprising alternately heating and chilling the metal pieces in the presence of water, of vapor, of citric acid, and of glycerine before lacquering.

5. The method of treating plated metal pieces of the class described prior to lacquering to prevent spotting out, comprising alternately subjecting the metal to steam and cold water and drying before lacquering.

6. The method of treating plated metal pieces of the class described prior to lacquering to prevent spotting out, comprising alternately subjecting the metal to steam and the vapors of citric acid and cold water and drying before lacquering.

7. A treating agent for treating metal to prevent spotting out, comprising a solution in water of a compound from the group of citric acid and lemon juice, and caffeine.

8. A treating agent for treating metal to prevent spotting out, comprising a solution in water of a compound from the group of citric acid and lemon juice, and glycerine.

9. A treating agent for treating metal to prevent spotting out, comprising water ten gallons, lemon juice one gallon, and glycerine eight to sixteen ounces.

10. A treating agent for treating metal to prevent spotting out, comprising water ten gallons, lemon juice one gallon, glycerine eight to sixteen ounces, and caffeine one ounce.

OSCAR G. SMIDEL.