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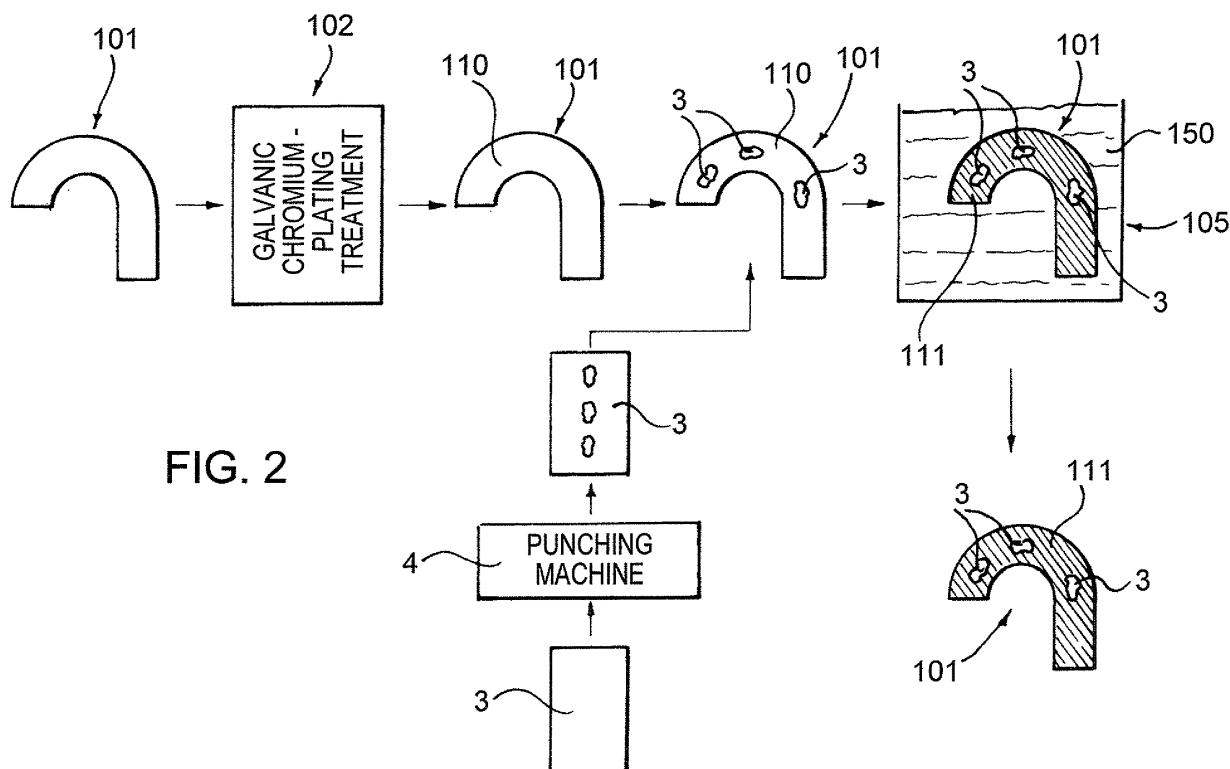
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(54) **Process for decorating metal articles, in particular taps and fittings**

(57) A process is disclosed for decorating metal articles, in particular taps and fittings.

The process provides for the application of a film template (3) on the finished surface (10; 110) of a metal item (1; 101), for the immersion of the metal item (1; 101) with the film template (3) in an aqueous solution (50, 60;

150) able to act on the finished surface of the metal item to modify the chromatic appearance thereof, and for the removal of the film template (3) so as to obtain a chromatic contrast between the finished surfaces that have remained protected by the film template and the surfaces on which the aqueous solution (50, 60; 150) has acted, which have not been protected by the film template (3).



Description

[0001] The present invention refers to a process for decorating metal articles, in particular taps and fittings.

[0002] For aesthetic reasons, the need to provide aesthetic decorations on the visible surface of metal articles is felt particularly in the field of taps and fittings, plumbing and bathroom design.

[0003] According to the prior art, this type of decoration is normally carried out by applying varnish or enamel freehand or by working the item with abrasive surface finishing machines. It is obvious that such systems prove to be very slow and costly and the end result is left to the operator's skill.

[0004] To overcome these drawbacks in part, surface decoration methods that use a laser beam or a pressing stamp are known to the art. However, both such methods show little versatility, since they can only be applied to flat surfaces and are therefore not suitable for decorating taps and fittings, which generally have a curved, tubular shape.

[0005] In fact it must be considered that the laser beam is diffracted on a curved surface and cannot be collimated, unless complex and costly collimation systems are used. Likewise, it is extremely costly and complex to make a stamp having a curved stamping surface, adapted to match the radius of curvature of the item to be decorated.

[0006] Furthermore, it must be considered that the laser burns the surface of the item, allowing a limited possibility of chromatic variation between the decorative motifs and the background.

[0007] Object of the present invention is to overcome the drawbacks of the prior art by providing a process for decorating metal items, in particular taps and fittings, that is versatile, practical, rapid, cheap and simple to carry out.

[0008] Another object of the present invention is to provide such a process for decorating metal items that is able to guarantee decorations of a pleasing aesthetic appearance, with different types of chrome finish that remain over time and can be reproduced industrially.

[0009] These objects are achieved in accordance with the invention with the characteristics listed in appended independent claim 1.

[0010] Advantageous embodiments of the invention are apparent from the dependent claims.

[0011] According to the invention, the process for decorating metal articles, in particular taps and fitting, comprises the following steps:

- surface finishing of a rough metal item so as to obtain a finished surface;
- cutting of an acid-resistant film so as to form a film template which covers or leaves exposed at least one surface destined to form a decorative motif;
- applying said film template to said finished surface of the metal item, so as to cover some portions of

surface and to leave other portions of surface exposed;

- immersing said metal item with the film template in an aqueous solution able to act on the finished surface of the metal item left exposed by the film to modify the chromatic appearance thereof; and
- removing the film template so as to obtain a chromatic contrast between the finished surfaces that have remained protected by the film template and the surfaces on which the aqueous solution has acted, which have not been protected by the film template.

[0012] The advantages of the invention are evident in that it allows decorative motifs of various shapes to be produced, by means of a reproducible industrial process and on items of various shapes, such as, for example, taps and fittings with a curved, tubular shape.

[0013] Further characteristics of the invention will be made clearer by the detailed description that follows, referring to a purely exemplifying and therefore non limiting embodiment thereof, illustrated in the appended figures, wherein:

Figures 1A and 1B represent a block diagram showing schematically the various steps in the decorating process according to a first embodiment of the invention; and

Figure 2 is a block diagram showing the initial steps in the decorating process according to a second embodiment of the invention.

[0014] The process for decorating metal articles according to the invention is described with the aid of the figures.

[0015] With reference to Figure 1A, the process starts with a rough metal item, such as, for example, a brass tap 1, which is subjected to surface finishing processes, such as, for example, polishing with a polishing machine 2, so as to obtain a shiny surface 10.

[0016] A film of acid-resistant plastic material 3, such as, for example, polyvinyl chloride (PVC) is selected. The film 3 preferably has an adhesive surface adapted to adhere to a metal material. Cuts 30 are made in said film 3 so as to remove pieces of the film 3 and to form a template. The cuts 30 are made in such a way that the area defined by the perimeter of the cut forms the decorative motif that is to be represented on the metal item 1. The cuts 30 can be made manually, but also automatically, by means of a shearing die or of a punching machine.

[0017] The tap 1 is cleaned and degreased with industrial detergents and the adhesive film template 3 is applied to the tap 1, so as to cover partially the shiny surface of the tap and to leave portions of shiny surface 10 exposed.

[0018] At this point the tap 1 with the film template 3 is placed in an electrolyte tank 5 containing a galvanic bath 50 of water and salt able to promote the migration

of the metal ions. An anode 51, for example a copper metal bar, is placed in the tank 5, whilst the cathode is represented by the tap 1 to be coated.

[0019] A potential difference is generated between the anode 51 and the cathode 1 so as to negatively charge the cathode 1 and to start a process of galvanic copper coating, lasting about 3-4 minutes. The positive copper ions (Cu⁺) migrate in the aqueous solution 50 from the anode 51 to the cathode 1 and are deposited on the areas of the surface 10 of the tap that are not covered by the film 3 and are negatively charged. As a result, areas 11 galvanically coated with copper are obtained, coinciding with the decorations that are to be obtained.

[0020] The tap 1 is removed from the electrolyte tank 5 and immersed in another burnishing tank 6 to be subjected to a burnishing process lasting about 5 minutes. For this purpose, the tank 6 is filled with an acid solution 60 that has copper oxidising characteristics. In this manner the areas of galvanic copper coating 11 that are not covered by the film 3 form a surface oxide layer 12 which gives a darker appearance.

[0021] Once the burnishing process is finished, the tap 1 is removed from the tank 6 and dried, for example by means of a fan oven 7 (Figure 1B) or of jets of hot air. When the tap 1 is perfectly dry, it is sent to a satin-finishing machine with brushes 8 which carries out the satin finishing of the item. Thus these burnished areas 12 that are not covered by the film 3 are satin finished, so as to take on the appearance of old satin-finished copper.

[0022] Lastly, the film 3 is removed and a transparent protective varnish is sprayed onto the tap, for example by means of a varnishing spray-gun 9. In this manner, in the finished item 1 a clear contrast is noted between the background 10 of shiny brass and the decorations 12, which resemble old satin-finished copper.

[0023] If a background of old satin-finished copper and decorative motifs in shiny brass are desired, it is sufficient to make a negative film template 3. That is, the film is left on the surface on which the decorative motif is desired and is removed from the surface on which the background is desired.

[0024] Clearly, in place of the copper anode 51 an anode of another metal, such as for example chromium, silver, gold or the like can be placed in the galvanic bath 50, to obtain a galvanic coating of a chromium, silver or gold type or the like.

[0025] As shown in Figure 2, in a second embodiment of the invention the rough metal item 101 is a brass tap that has undergone a surface galvanic chromium-plating treatment 102 by means of a chromium-nickel alloy, so as to obtain a chromium-plated outer surface 110.

[0026] A film template 3 with negative decorative motifs is applied to the chromium-plated surface 110. That is, the film 3 covers the surface on which the decorative motifs are to be applied and the chromium plating 110 remains exposed on the background.

[0027] The tap 101 is immersed in a tank 105 containing a solution of acids 150 adapted to eat into the surface

chromium. As a result, nickel 111 remains on the background exposed by the film 3.

[0028] The tap 101 undergoes the same treatments described with reference to Figure 1B, namely drying, satin finishing, removal of the film 3 and application of a transparent varnish. In this manner an end product 101 having chromium-plated decorative motifs on a background 111 of satin-finished nickel is obtained.

[0029] Numerous changes and modifications of detail within the reach of a person skilled in the art can be made to the present embodiments of the invention without thereby departing from the scope of the invention as set forth in the appended claims.

Claims

1. A process for decorating metal articles, in particular taps and fittings, comprising the following steps:

- surface finishing of a rough metal item (1; 101) so as to obtain a finished surface (10; 110);
- cutting of an acid-resistant film (3) so as to form a film template which covers or leaves exposed at least one surface destined to form a decorative motif;
- applying said film template (3) to said finished surface (10; 110) of the metal item, so as to cover some portions of surface and to leave other portions of surface exposed;
- immersing said metal item (1; 101) with the film template (3) in an aqueous solution (50, 60; 150) able to act on the finished surface (10; 110) of the metal item left exposed by the film, so as to change the chromatic appearance thereof; and
- removing the film template (3) so as to obtain a chromatic contrast between the finished surfaces (10; 110) that have remained protected by the film template and the surfaces on which the aqueous solution (50, 60; 150) has acted, which have not been protected by the film template (3).

2. A process according to claim 1, **characterised in that**, after the action of said aqueous solution and before removing the film template (3), the metal item is subjected to a satin-finishing treatment, so as to satin-finish the surfaces that are not covered by the film template (3).

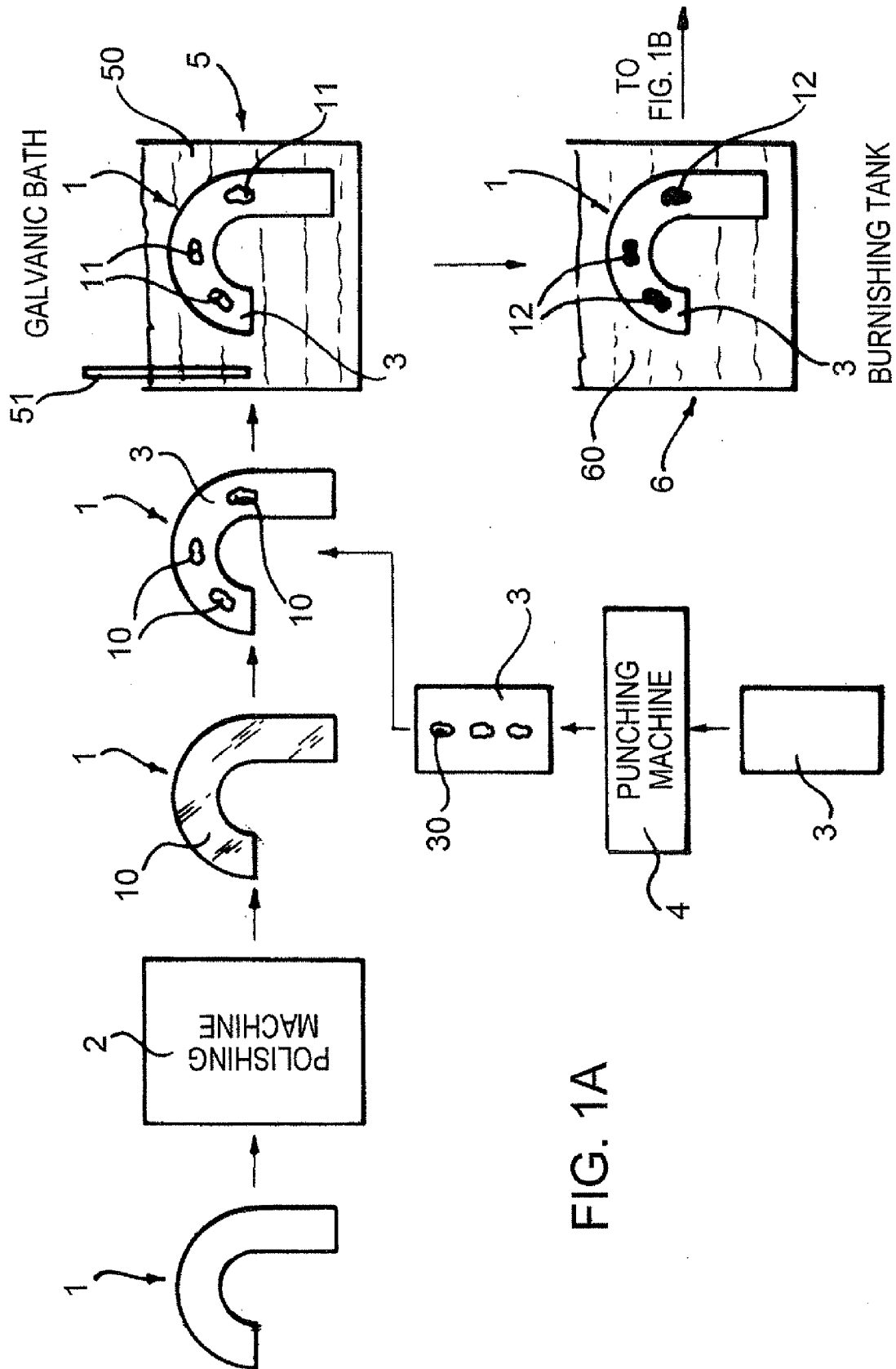
3. A process according to claim 2, **characterised in that**, before said satin-finishing treatment, the metal item is dried by means of a fan oven or of a jet of hot air.

4. A process according to any one of the preceding claims, **characterised in that** said metal item is subjected to a final treatment of varnishing with a transparent varnish.

5. A process according to any one of the preceding claims, **characterised in that** said treatment in an aqueous solution provides for the immersion of the metal item in a galvanic bath (50) and for the application of a potential difference to obtain a galvanic coating (11) of the areas not covered by the film template (3). 5
6. A process according to claim 5, **characterised in that** said galvanic coating (11) provides a coating of copper, of chromium, of silver, of gold or of similar metals. 10
7. A process according to any one of the preceding claims, **characterised in that** said treatment in an aqueous solution entails the immersion of the metal item in a burnishing bath (6) containing an acid solution (60) able to obtain the oxidation (12) of the areas of the metal item not covered by the film template (3). 15 20
8. A process according to any one of the preceding claims, **characterised in that** said treatment in an aqueous solution entails the immersion of the metal item in an acid bath (150) able to eat into the surface finishing of the areas of the metal item not covered by the film template (3). 25
9. A process according to any one of the preceding claims, **characterised in that** said surface finishing process on the rough metal item entails a polishing. 30
10. A process according to any one of the preceding claims, **characterised in that** said surface finishing process on the rough metal item entails a galvanic chromium plating. 35
11. A process according to any one of the preceding claims, **characterised in that** said rough metal item is made of brass. 40
12. A process according to any one of the preceding claims, **characterised in that** said rough metal item is a tap and fitting. 45
13. A process according to any one of the preceding claims, **characterised in that** said rough metal item has a curved, tubular shape. 50

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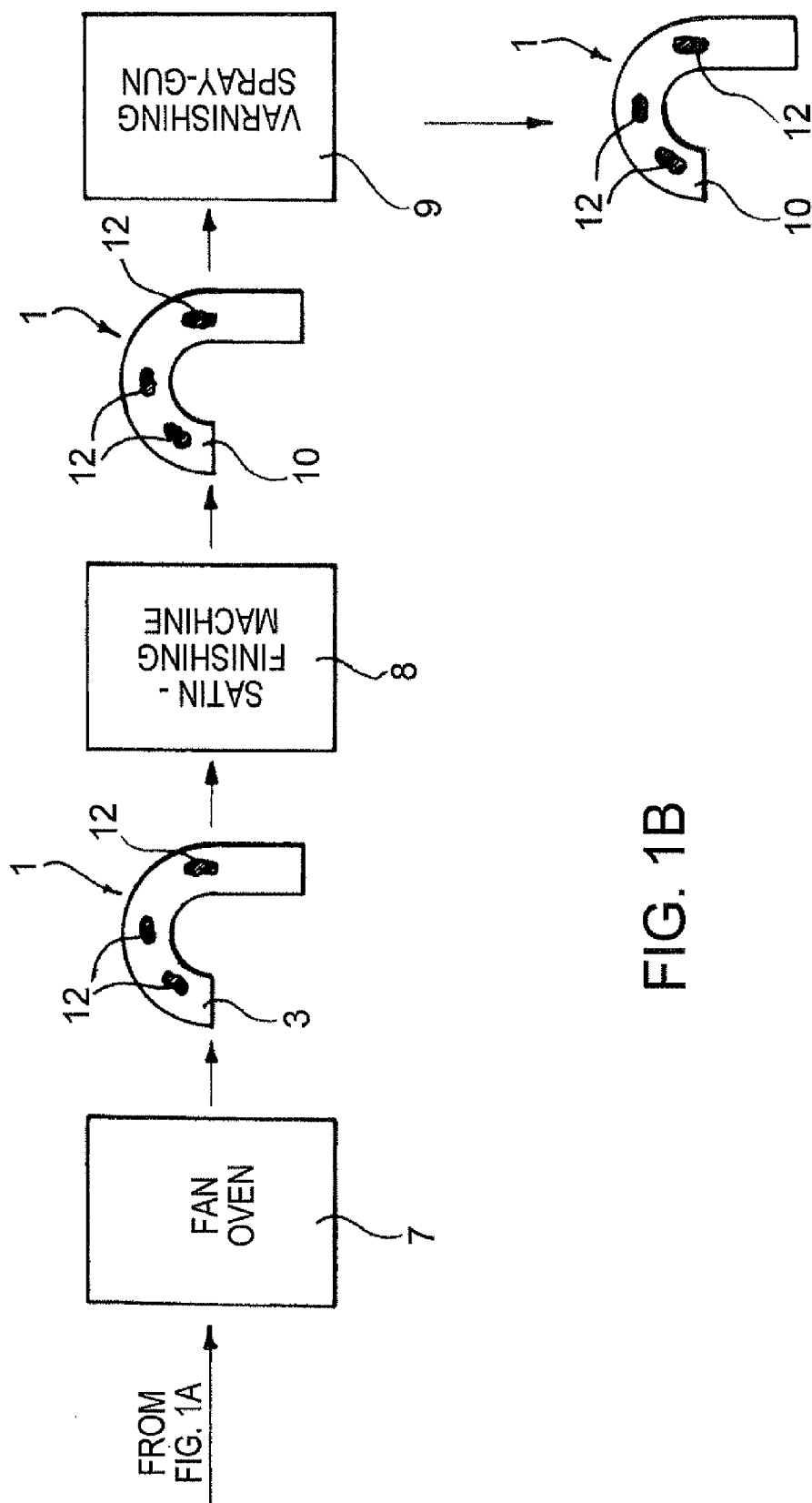


FIG. 1B

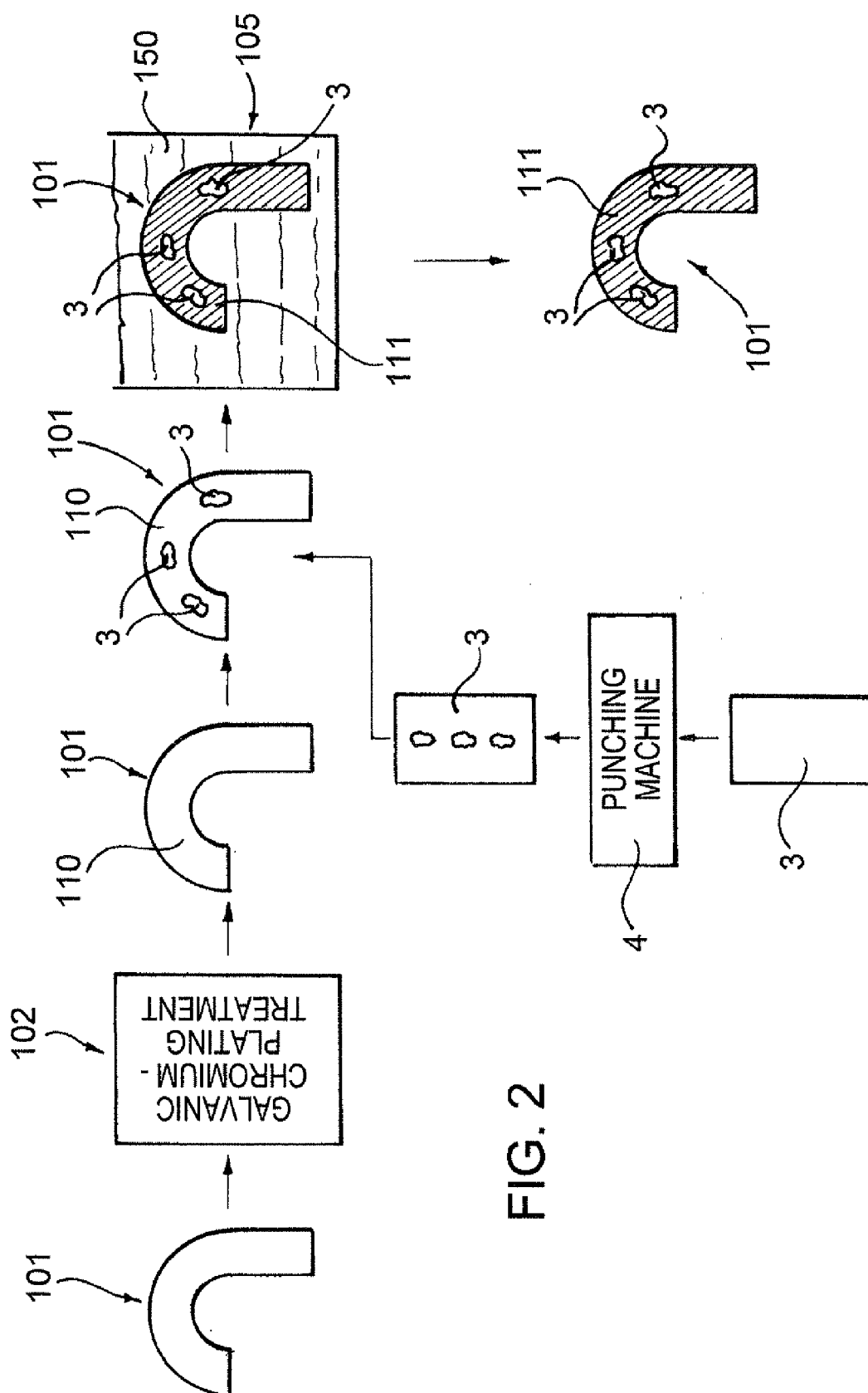


FIG. 2