A control element for a household appliance is provided. The control element has a base member made of plastic. The base member has a nickel coating, and a noble metal coating is applied to the nickel coating.
CONTROL ELEMENT FOR A HOUSEHOLD APPLIANCE

[0001] The invention relates to a control element, in particular a knob, for a household appliance with a base member made of plastic, having a nickel coating. The invention likewise relates to a method for the manufacture of such a control element.

[0002] Household appliances, such as for example gas cooktops, electric cooktops, ovens, dishwashers or washing machines frequently have control elements embodied in plastic, whose surface is, at least in a visible area, coated with metal. The control element hereby takes on a visual appearance and haptic properties, which come close to those of a control element completely embodied in aluminium or stainless steel. Nickel, which is applied galvanically to the base member, is frequently used as the metal for coating the base members formed from plastic. The nickel coating can be mechanically processed, for example ground or brushed, in order to create the desired surface structure.

[0003] Generic control elements are for example rotatable knobs, which frequently have a cylindrical exterior surface. To actuate the household appliances, the knob is rotated about a central axis. To this end an operator grips the knob by its peripheral surface. In certain applications, the knob can also be moved in an axial direction. This is for example the case with knobs of gas cooktops, where the knob must first be depressed, in order then to be able to rotate it from its zero position. So-called “pop-out” knobs, which can be retracted flush with a fascia of the household appliance, are likewise movable in an axial direction.

[0004] Generic control elements according to the prior art have the disadvantage, that surfaces made of nickel are not resistant to many substances occurring within a household, and the nickel surface is attacked for example by lactic acid, mustard or perspiration from hands. There is in addition the risk of dermatological reactions, if an operator suffers from a contact allergy to nickel.

[0005] It is known that these disadvantages are avoided through the application of a protective lacquer onto the nickel surface. However this gives rise to disadvantages related to the wear-resistance of the surface. Also, the desired metallic “feel” of the control element is no longer provided after application of the protective lacquer.

[0006] The object of the present invention is thus to make available a control element of the type named and a method for the manufacture of the control element, which has improved resistance against external influences.

[0007] According to the invention this object is achieved with regard to the control element in that a noble metal coating is applied to the nickel. The surface of the control element is thus formed by the noble metal layer, which cannot be attacked by external chemical influences. A lasting constant external appearance of the knob is thus guaranteed.

[0008] The provision of a palladium coating or a coating with a palladium alloy as the noble metal coating is particularly advantageous. The optical properties of a palladium coating resemble the optical properties of the nickel coating formerly used. Thus with the inventive control element the visual appearance of a control element completely made of stainless steel can be replicated. Palladium as a coating material possesses the further advantage that it can be obtained at more reasonable cost than other noble metals.

[0009] Particularly advantageously the noble metal coating has a coating thickness between 0.5 μm and 1.5 μm, preferably between 0.8 μm and 1.2 μm. In the case of this coating thickness it is ensured that the control element is completely enrobed by the noble metal coating and media having an external effect on the control element cannot damage the nickel coating. A direct contact between the skin of an operating person and the nickel coating beneath the noble metal coating is likewise ruled out. On the other hand the coating thickness of the noble metal coating is so minimal, that a surface structure of the nickel coating remains practically unchanged visually. A particularly appealing optical surface structure of the control elements is achieved in that the surface of the nickel coating is mechanically processed, for example ground or brushed. The thin noble metal coating is thus applied to the mechanically processed nickel surface.

[0010] To this end the nickel coating has a coating thickness between 10 μm and 25 μm,

[0011] preferably between 15 μm and 25 μm. With this coating thickness the suitability of the nickel surface for mechanical processing is guaranteed, such that the nickel coating is at no point completely eroded.

[0012] Good durability of the metallic coatings on the plastic base member is thereby guaranteed, a copper coating is applied to the base member, underneath the nickel coating.

[0013] The copper coating has a coating thickness between 10 μm and 25 μm, preferably between 14 μm and 25 μm.

[0014] The plastic of the base member contains a polycarbonate and/or an acrylonitrile butadiene styrene and/or a polyamide. The plastics cited can be advantageously metallically coated in a durable manner.

[0015] Here, the nickel coating and/or the noble metal coating and/or the copper coating are applied galvanically.

[0016] It is important that the sum of the coating thicknesses of all applied metal coatings does not exceed 0.1 mm. It is thereby ensured that the low heat conductivity of the plastic base member is not or not significantly increased by the metallic coatings. Low heat conductivity is in particular advantageous in the case of control elements of cooktops, so that the heat arising during the cooking process does not result in excessive heating of the control element.

[0017] As regards the method for the manufacture of a control element for a household appliance, the aforementioned object is achieved in that the method comprises the following method steps: galvanic application of a nickel coating: mechanical processing of a surface of the nickel coating: galvanic application of a noble metal coating.

[0018] Before the application of the nickel coating, a copper coating is galvanically applied to the base member. The noble metal coating takes the form of a palladium coating or a coating with a palladium alloy. The noble metal coating is applied with a coating thickness between 0.5 μm and 1.5 μm preferably between 0.8 μm and 1.2 μm. All the described features of the inventive control element are likewise relevant to the inventive method for the manufacture of the control element relevant and are thus part of the method invention.

[0019] Further advantages and details of the invention are explained in detail on the basis of the exemplary embodiment in the schematic figures. Wherein

[0020] FIG. 1 shows a household appliance embodied as a gas cooktop,

[0021] FIG. 2 shows an inventive control element embodied as a knob,

[0022] FIG. 3 shows a knob in a cross-sectional view,
FIG. 4 shows a section from a base member of the knob.

FIG. 1 shows a household appliance in the form of a gas cooktop. The gas cooktop has four gas burners 11 arranged on a cooktop plate 14. A pan support 12 is assigned to each of the gas burners 11. Cooking vessels, for example pots or pans, can be disposed on the pan supports 12 in such a way that they are positioned just above a burner 11, and are heated by the gas flame burning at the burner 11. In the frontal area of the gas cooktop 10 is located an operator control area 13, on which are arranged the four control elements 1, embodied as knobs, for controlling the gas burners 11. The operator control area 13 can be embodied as an element of the cooktop plate 14 or as a separate part.

An inventive control element 1, embodied as a knob, is shown, three-dimensionally, in FIG. 2. It can be seen that the control element 1 has an essentially cylindrical base member 2, which forms the visible surface des control element 1. The base member 2 has a recess 8 on its front face, which serves to indicate the zero position of the control element 1. On its peripheral surface the base member 2 has further recesses 9, which serve to improve its visual appearance and in particular should increase the frictional grip between the control element and the hand of the operator.

In FIG. 3 a section through the control element 1 enables its structural makeup to be seen. The base member 8 is mounted on an internal body 3 of the control element 1 and connected to the same in non-releasable form. With the internal body 3, the control element 1 is slid onto a switch shaft of a gas valve and is held thereupon by means of a leaf spring 4 inserted into the internal body 3.

The marked section A of the base member 2 is represented in enlarged form in FIG. 4. A section of the base member 2 embodies in plastic can be seen here. The plastic is applicable for example, of a mixture of polycarbonate (PC) and acrylonitrile butadiene styrene (ABS), or a polyamide (PA). A copper coating 5 with a thickness of preferably 14 μm is galvanically applied directly to the plastic of the base member 2. On top of the copper coating 5 is a galvanic nickel coating 6 with a coating thickness of preferably 15 μm. The visible surface of the control element, which can be grasped by the operator, is formed from a noble metal coating 7, which is galvanically applied, externally on the nickel coating 6. The inventive noble metal coating 7 preferably takes the form of a palladium coating with a coating thickness of 1 μm. The wall thickness of the base member 2 and the coating thicknesses of the copper coating 5, the nickel coating 6 and the noble metal coating 7 are not reproduced to scale in FIG. 4.

The nickel coating 6 is mechanically processed prior to the application of the noble metal coating 7, for example ground or brushed. The operating knob thereby receives a stainless-steel appearance. The noble metal coating 7 is so thin, that the surface structure of the nickel coating 6 remains visible. Where palladium is used as the noble metal 5 the control element also has a stainless steel-like color and refrigency. In that the control element 1 possesses a metallic surface, the tactile grip quality of the control element corresponds to that of a completely embossed in metal.

LIST OF REFERENCE CHARACTERS

1 Control element
2 Base member
3 Internal body
4 Leaf spring
5 Copper coating
6 Nickel coating
7 Noble metal coating
8, 9 Recesses
10 Gas cooktop
11 Burner
12 Pan support
13 Operator control area
14 Cooktop plate
15. (canceled)
16. A control element for a household appliance, the control element comprising a base member made of plastic, wherein the base member has a nickel coating, and wherein a noble metal coating is applied to the nickel coating.
17. The control element of claim 16, wherein the control element is a knob.
18. The control element of claim 16, wherein the noble metal coating is one of a palladium coating and a coating with a palladium alloy.
19. The control element of claim 16, wherein the noble metal coating has a coating thickness between 0.5 μm and 1.5 μm.
20. The control element of claim 19, wherein the coating thickness is between 0.8 μm and 1.2 μm.
21. The control element of claim 16, wherein a surface of the nickel coating is mechanically processed.
22. The control element of claim 21, wherein the surface of the nickel coating is one of ground and brushed.
23. The control element of claim 16, wherein the nickel coating has a coating thickness between 10 μm and 25 μm.
24. The control element of claim 23, wherein the coating thickness is between 15 μm and 25 μm.
25. The control element of claim 16, wherein a copper coating is applied to the base member underneath the nickel coating.
26. The control element of claim 25, wherein the copper coating has a coating thickness between 10 μm and 25 μm.
27. The control element of claim 26, wherein the coating thickness is between 14 μm and 25 μm.
28. The control element of claim 16, wherein the plastic of the base member contains at least one of a polycarbonate, an acrylonitrile butadiene styrene, and a polyamide.
29. The control element of claim 25, wherein at least one of the nickel coating, the noble metal coating, and the copper coating are galvanically applied.
30. The control element of claim 25, wherein the sum of the respective coating thicknesses of the nickel coating, the noble metal coating, and the copper coating is applied to the base member does not exceed 0.1 mm.
31. A method for manufacturing a control element for a household appliance, wherein the control element has a base member made of plastic, the method comprising:
   galvanically applying a nickel coating;
   mechanically processing a surface of the nickel coating; and
   galvanically applying a noble metal coating.
32. The method of claim 31, wherein the control element is a knob.
33. The method of claim 31, wherein, prior to the application of the nickel coating to the base member, a copper coating is galvanically applied.
34. The method of claim 31, wherein the noble metal coating is one of a palladium coating and a coating with a palladium alloy.

35. The method of claim 31, wherein the noble metal coating is applied with a coating thickness between 0.5 μm and 1.5 μm.

36. The method of claim 35, wherein the coating thickness is between 0.8 μm and 1.2 μm.

37. A household appliance, comprising:
   a control element having a base member made of plastic, wherein the base member has a nickel coating, and wherein a noble metal coating is applied to the nickel coating.

38. The household appliance of claim 37, wherein the household appliance is a gas cooktop.

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