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(71) Applicant (for all designated States except US): **ELECTROLUX DO BRASIL S.A.** [BR/BR]; Rua Ministro Gabriel Passos, 360, Guabirota, 81.520-900 Curitiba - PR (BR).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **ALBUQUERQUE, Gustavo Cavalcanti de** [BR/BR]; R. Heitor de Andrade, 744 Casa 06, Jardim das Américas, 81.350-310 Curitiba - PR (BR).

(74) Agent: **BARIL, Natan**; Rua Senador Xavier da Silva, 488, 206 A, 80.530-060 Curitiba - PR (BR).

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(54) Title: TOUCH - SENSITIVE PANEL TO APPLY IN HOUSEHOLD APPLIANCES

(57) Abstract: Touch-sensitive panel to apply in household appliances, notably called 'white goods' such as stoves, dishwashers, washing machines and ovens, that presents a finger touch-sensitive insulating surface, with translucent contrast, of a plastic material, preferably polycarbonate, supplied with a conductive and semi-transparent ink, that makes the panel composition to enable its lighting without the need to drill the piece or its decorative cover, and also allowing the perception of the touch or the sliding on the surface to control the equipment to which the panel is applied.



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TOUCH-SENSITIVE PANEL TO APPLY IN HOUSEHOLD APPLIANCES

Field of the Invention

This invention refers to touch-sensitive panels applied to household
5 appliances, notably those called 'white goods', such as stoves, dishwashers,
washing machines and ovens, that presents a finger touch-sensitive
insulating surface, with translucent contrast, of a plastic material,
preferably polycarbonate, supplied with a conductive and semi-transparent
ink, that makes the panel composition to allow its lighting without the need
10 to drill the piece or its decorative cover, and also allowing the perception of
the touch or the sliding on the surface to control the equipment to which the
panel is applied.

Background of the Invention

Traditionally, household appliances present a panel to select the operation
15 options with a user interface, in which the handling possibilities are likely
to be chosen through keys, buttons or a combination thereof, which must be
triggered by the user. Examples of such devices are the refrigerators panel
keys, which allow the selection of fast refrigeration modes for the freezer.
Currently, there are already touch-sensitive panels, facilitating a lot the user
20 operation and reducing mechanical breaches and damages caused by the
absence of mobile parts in the panel subject to the user interaction.

Such devices should enable the best possible interaction of the User with
the equipment functions, facilitating its control according to the type of
operation to be performed. A washing machine, for example, should enable
25 the access to the most suitable operation mode according to the clothing
type to be washed, and a microwave oven should allow the combination
selection of the power and time specific operation for each type of food to
be prepared or particular action, such as defrosting, heating, baking, etc.

In order to make this configuration feasible, it is necessary that the panel presents the relevant information allowing the choice by the User in a clear and evident manner, easing and quickening the operation selection desired by the User. This information comprises a set of printed opaque portion, icon, drawings or words-shaped, on areas defined of panel which, lighted, allows this information visualization through the passage of light in the non-printed parts.

Traditionally, this lighting enables the passage of light from a generator device, through the panel, using drilled areas in the printing allocated on the inner or outer surface of such panel to make feasible the perception of the information through the opaque areas contrasting with the rest.

The printing of the desired information is usually made on the rear side of the plate applied to the inner side of the translucent panel, allowing the visualization of the information presented in the film when the light passes to illuminate the panel. Thus, the lighting highlights the information printed by the contrast with the drilled parts. Further, the printing can be made directly on the inner side of the translucent panel, without the need of the plate.

When such plate or the direct printing uses a conductive ink, it allows the association of the printed information with the activation of certain function through a capacitive association initiated by the User when placing one finger on the information on the control panel face. When installed in the equipment, the panel conductive ink can communicate with the electronic circuit adapted to perceive the capacitive association and control the equipment. The relevant information, printed on the plate or directly on the panel, gathered in a single of variable outlines, adapted to the equipment to which the control panel is intended to be installed.

The inconvenient of such approach is the need to have drilled areas, i.e. without printing, allowing the contrast light passage. Thus, the printing area

and the likelihood of providing more information is limited, and also the restriction the additional items such as decorative paintings.

Further, the information printed with an opaque ink implies necessarily in show such information regardless of the lighting embed in the panel. That is, the information is visible all the time, indistinctly, being impossible to
5 hide the information in a moment where is not needed or desired.

State of Art Analysis

Document US 2005/0078027A1 describes a touch-sensitive control panel supplied with approach sensors and a control system to avoid the accidental
10 activation of the touch type keyboards in household appliances, aiming to protect the User against the risk of an improper activation of the device panel. As the document is restricted to the practical application of perceiving the touch approach through sensors, in order to avoid the improper activation of the equipment, and does not mention aspects
15 regarding the use of plastic material, it is different from the present invention. American patent US 2006/0236624A1 describes a device to control a microprocessor in concrete that comprises a touch keyboard from a kind of resin, or even a synthetic or natural stone, supplied with small channels through which the touch perception is performed, through the
20 passage of a light beam or any other type of electric or light signal from one side to another of the material. Since it approaches a different technology, it differs from the present invention scope.

Document US2007/031161A1 defines a control panel profile for capacitive touch comprised by capacitive sensors using a flexible plastic (acrylic or
25 polycarbonate), translucent or transparent, with the printed keys of conductive ink on the film itself, to use in touch-sensitive panels in household appliances. Since it does not mention the use of semi-transparent ink on the control panels, it differs from the present invention.

Brief description of the embodiment

This invention describes a panel for household appliances, touch-sensitive and finger sliding-sensitive, with translucent contrast touch surface, of plastic material, preferably the polycarbonate, allowing the lighting by any kind of accessory device that generates a light beam incident on a specified area of the panel or on the whole extension of it. The devices can be several, such as lamps or leds.

In order to allow the choice of the household appliance operation mode, the panel presents the information needed allocated on its surface, printed with semi-transparent serigraphic metallic ink, enabling the light passage in order to visualize such information.

Thus, certain areas of the panel can be lighted in function of the selection made by the User, revealing the information pertinent to the equipment operation in the ongoing operation mode or to be defined by the user.

The use of a conductive and semi-transparent ink makes the panel composition to enable the lighting of the panel without the need of drilling the piece or its decorative cover, and also allowing the perception of the touch or sliding on the surface to control the equipment to which the panel is applied.

Further, the semi-transparent serigraphic metallic ink allows the interaction between the panel and the electro-electronic elements of the inner circuit, enabling the electrical conduction between them. For that, it is foreseen an ink composed by silver with carbon pigments, where this is necessary to avoid a possible oxidation of the metallic part contact with the ink, specially for any repair need, also enabling the panel to become a mobile piece, comprising a cover to the equipment, for example.

The panel can also be supplied with a screen configured to exhibit texts or graphics associated with at least one of the household appliances applications.

According to the aspect of the invention, when the equipment is turned off, the information is not shown to the User, and the panel remains clear, free of highlights referring to such information.

In other aspect of the invention, certain areas of the panel are lighted in function of the selection made by the User, such as options for cooking of specific food, chosen by the User, due to the additional information, not relevant for that particular food selected. More specifically in this approach, when the meat cooking is selected, the User is not able to visualize the options referring to other types of foods by the absence of the lighting in the areas where such information is printed with the semi-transparent ink.

This invention is not limited to the representations mentioned or illustrated herein, and it has to be comprehended in its wide scope. Many changes and other representations of the invention will come in mind of those skilled in the technique to which this invention belongs, having the learning benefit presented in previous descriptions and attached drawings. Further, it is to be understood that the invention is not limited to the disclosed specific shape and that changes and other shapes are understood as enclosed within the scope of the attached claims. Although specific terms are nominated herein, they are only used in a generic and descriptive form and not for a limiting purpose.

CLAIMS

TOUCH-SENSITIVE PANEL TO APPLY IN HOUSEHOLD APPLIANCES

1. Touch-sensitive panel applied to household appliances,
5 **characterized by** being supplied with a semi-transparent metallic ink.
2. Semi-transparent metallic ink according to claim 1, **characterized by** being a vinyl serigraphic.
3. Semi-transparent metallic ink according to claim 1, **characterized**
10 **by** presenting a composition of silver and carbon.
4. Touch-sensitive panel applied to household appliances according to claim 1, **characterized by** being comprised of a plastic material.
5. Touch-sensitive panel applied to household appliances according to claim 1, **characterized by** being comprised of polycarbonate.
- 15 6. Touch-sensitive panel applied to household appliances according to claim 1, **characterized by** having a visualization screen to exhibit the operation options of the household appliance and the User interface.