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(54) **BLOCKING DEVICE FOR THE DOOR OF AN ELECTRIC HOUSEHOLD APPLIANCE, IN PARTICULAR THE DOOR OF A WASHING MACHINE**

BLOCKIERVORRICHTUNG FÜR TÜR EINES ELEKTRISCHEN HAUSHALTSGERÄTS, INSBESONDERE TÜR EINER WASCHMASCHINE

DISPOSITIF DE BLOCAGE POUR LA PORTE D'UN APPAREIL MENAGER ELECTRIQUE, EN PARTICULIER LA PORTE D'UNE MACHINE A LAVER

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(56) References cited:  
**EP-A- 1 137 030 DE-C1- 4 414 325**  
**US-A1- 2004 104 580**

**EP 1 861 535 B1**

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**Description**TECHNICAL FIELD

**[0001]** The present invention concerns a blocking device for a door of an electric household appliance, in particular for the door of a front-loading washing machine.

BACKGROUND ART

**[0002]** It is known that the doors of electric household appliances in which a wash cycle is carried out, in particular of washing machines, are blocked in closed position during use by a blocking device, which is released only once the wash cycle has ended and, therefore, when there is no water inside the machine.

**[0003]** The known devices as that shown in EP1137030A1 include a body that can be fixed to a frame of the electric household appliance, laterally to a door to be blocked, a striker in the form of a striking plate held sliding by the body perpendicular to the door and suited to cooperate in use with a notch of the door, a pawl for blocking the sliding of the striking plate, and control means for selectively moving the pawl between an extended position and a retracted position in/from a corresponding through perforation in the striking plate. The control means are defined by a bimetallic spring situated close to a resistive pill having positive temperature coefficient (PTC) and coupled to a bistable elastic device; when the electrical appliance is operating, the supplied electric current heats the resistive pill which heats the bimetallic spring, making the bistable electric device snap into a position in which the pawl is brought into the extended position, in which it engages the perforation in the striking plate, blocking the transverse sliding of the latter and, consequently, preventing it from being released from the notch even if the user tries to force the door into open position.

**[0004]** A first drawback of the known devices described consist of the high consumption of electric energy, even though it is limited by the fact that, as the resistive PTC pill heats, its electrical resistance decreases. Moreover, the devices of the type described are bulky and relatively complex, as they usually also need a mechanism that amplifies the movement of the bimetallic spring, to guarantee a sufficient travel of the pawl; then, in any case, the travel of the pawl remains limited. But, above all, the known devices present the drawback that the blocking device remains inserted for a certain time even after the end of the wash cycle and, therefore, the end of the passage of electric current, due to the cooling time necessary for the PTC pill. In fact, only when the resistive pill completely cooled down can the bimetallic spring snap back into starting position, bringing the pawl into retracted position outside the through perforation in the striking plate, so freeing the latter from the blocking action of the pawl.

**[0005]** A theoretically possible solution for this last drawback could be to use an electromagnet as a means

for controlling the pawl; however, such a solution does not solve the problem of the relatively high power consumption and does not allow a reduction of the overall bulk of the device. US2004/0104580 does not solve these problems.

DISCLOSURE OF THE INVENTION

**[0006]** It is the object of the present invention to overcome the drawbacks of the known devices described, by supplying a blocking device for the door of an electric household appliance, in particular for the door of a front-loading washing machine, not having the drawbacks described and, in particular, which at the same time ensures limited power consumption, the possibility of opening the door without delays, that is immediately after the appliance has stopped, a low production and assembly cost, reduced bulk and high reliability.

**[0007]** A further object of the invention is also to realise a device of the above type which has many parts in common with the known devices based on a PTC pill, so as to achieve a further reduction in production costs by using design components that have already been amortized.

**[0008]** Accordingly, the present invention relates to a blocking device for a door of an electric household appliance, in particular for the door of a front-loading washing machine, as defined in claim 1.

**[0009]** In particular, the blocking device is distinguished by the fact that the above-mentioned means for controlling the pawl comprise an actuator including an electrically resistive wire made of a shape memory alloy in such a way as to be able to vary its own length as an effect of its variation in temperature; means for supplying electric power to said resistive wire, suited to determine its controlled variation in temperature by joule effect; and cam means activated by said actuator and acting on a bistable elastic device directly controlling the position of said pawl.

**[0010]** Preferably, the means for supplying electric power to the resistive wire comprise means for intermediate bridging of the resistive wire suited to determine the controlled temperature variation only on, selectively, a first and a second half of the same.

**[0011]** Moreover, according to an aspect of the invention, the bistable elastic device that directly controls said pawl comprises a first flat spring and a second flat spring connected together at the respective free ends of the same, adjacent to each other, by a toggle-shaped coupling spring in particular in the shape of an upside-down U (with respect to the position of the pawl) and hinged on the side opposite said free ends of the first and second flat spring.

**[0012]** In this way a blocking device is obtained having an extremely limited bulk and weight and having high reliability, which maintains the same elements that make up the known PCT pill devices, in particular the pawl control mechanism based on a bistable elastic device of the many known types, replacing only the PTC pill and re-

spective bimetallic spring with a cam operated by a wire made of a shape memory alloy.

**[0013]** Minimum energy and heating consumption values are therefore obtained, as it is necessary to heat the resistive wire only long enough to cause its variation in length in the chosen sector, with consequent rotation of the cam means in a first predetermined direction; after that the supply of current may be completely suspended, as the consequent cooling of the previously heated length of wire does not bring about the release of the device; to cause the release of the pawl from the perforation in the striking plate, according to the invention, it will be necessary to heat another section of wire with a new supply of electric current, the resulting variation in the length of the wire will turn the cam means in the opposite direction to the previous one, returning the device to the original configuration.

**[0014]** Moreover, the actuation of the device, when both connecting and disconnecting, is almost immediate, thus eliminating waiting times at the end of the wash cycle, typical of the known blocking devices.

**[0015]** Lastly, the device of the invention uses a large number of components already used in the known devices based on the PTC pill, thus allowing the adaptation of existing designs and the use of existing components, with consequent great reductions in costs.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0016]** Further characteristics and advantages of the present invention will be apparent from the following description of a non limitative embodiment thereof, supplied purely by way of example, with reference to the figures in the attached drawings, wherein:

- figure 1 illustrates a perspective and three-quarter front top view of the blocking device of the invention; and
- figure 2 illustrates a rotated perspective view of the device in figure 1 with accessory parts with respect to the specific object of the invention illustrated with dashed lines for simplicity.

#### BEST MODE FOR CARRYING OUT THE INVENTION

**[0017]** With reference to figures 1 and 2, the reference number 1 indicates the whole of a blocking device in a closed position of a known and not illustrated door of an electric household appliance, also not illustrated for simplicity, for example a front-loading washing machine, which will be specifically referred to below without for this reason losing generality.

**[0018]** The device 1 comprises a body 6 which can be fixed in a known way to a frame of the electric household appliance, laterally to a door to be blocked, a striker in the form of a striking plate 8 (figure 2) held sliding by the body 6 perpendicular to the axis of rotation of the door and suited to cooperate in use with a known notch 9 of

the door, a pawl 10 for blocking the sliding of the striking plate 8, and control means, indicated overall with 11, for selectively moving the pawl 10 between an extended position towards the inside of a through perforation 13 in the striking plate 8 (indicated with hatching in figure 2), and a position retracted from the perforation 13.

**[0019]** In particular, the pawl 10 moves between said position extended from its seat in the body 6 and in which the pawl 10 engages the through perforation 13 in the striking plate 8, and said retracted position, in which it is inside its seat in the body 6 and, consequently, outside the perforation 13; in this retracted position, the striking plate 8 is consequently free to slide with relation to the body 6, transversely to the door, to disengage the notch 9, while in the extended position of the pawl 10 all sliding of the plate 8 is prevented by the engaging of the pawl 10 in the perforation 13.

**[0020]** The body 6 is made of an electrically non conductive material, for example a synthetic plastic, and houses inside it the control means 11 and all the other main components of the device 1.

**[0021]** According to the invention, the control means 11 comprise an actuator 20, comprising in turn, as actuating element, an electrically conductive resistive wire 21, made of a shape memory alloy (for example belonging to the family commercially known as DYNALLOY®), in such a way as to be able to vary its own length as an effect of its variation in temperature; the control means 11 also comprise means 22 for supplying electric power to the resistive wire 21, suited to determine its controlled variation in temperature by joule effect.

**[0022]** In the non limiting example illustrated, the electric power supply means 22 consist of a pair of contacts 23, 24 to which the opposite ends of the resistive wire 21 are connected in a way not illustrated and obvious for persons skilled in the art and, according to an aspect of the invention, of intermediate bridging means 27 for the resistive wire 21 (figure 1) suited to determine said controlled temperature variation only on, selectively, a first and a second portion, indicated respectively in figures as 21a and 21b, of the wire 21, which consist of the first and second half of the wire 21 itself.

**[0023]** In particular, as well as the wire 21 with the respective electric power supply means 22, the actuator 20 also includes a drum element 28 held idle by the body 6 on suitable supports and which said resistive wire 21 is wound around the circumference; the drum element 28 rotates around an axis B (figure 2) contained in a plane parallel to a plane on which lies the striking plate 8, and holds, angularly integral with and radially projecting from, cam means 31 having a predetermined profile.

**[0024]** The bridging means 27 consist of a first flat spring 35, made of an electrically conductive material and connected to a first electric contact 36 which protrudes externally from the body 6 (similar to contacts 23 and 24), and a screw 37 by means of which the spring 35 is connected integrally to the drum 28 so as to pinch the resistive wire 21 in the middle, gripped between the

flat spring 35 and the drum 28.

**[0025]** According to another qualifying aspect of the invention, instead of being directly moved by the actuator 20, the pawl 10 is directly controlled by a bistable elastic device 40, which in turn is commanded, in a way to be described, by the cam means 31.

**[0026]** In particular, the pawl 10 is directly controlled by the bistable elastic device 40, which cooperates in sliding contact, by rotation, with the cam means 31, situated in a position immediately below it.

**[0027]** The bistable elastic device 40 is of the same type as those employed in the known devices of the state of the art using as an actuator a bimetallic spring activated by a PTC pill, for example of the type described in EP1137030B1 by the same Applicant, and comprises a first flat spring 41 and a second flat spring 42 connected together at the respective free ends of the same, adjacent to each other, by a toggle-shaped coupling spring 43, in particular in the shape of an upside-down U (with respect to the position of the axis B), and hinged on the side opposite said free ends of the first and second flat spring, 41 and 42.

**[0028]** The pawl 10 is directly anchored to the second flat spring 42 in a known way, not illustrated for simplicity; the flat spring 42, which may have two different configurations, one illustrated as a continuous line and the other only schematically illustrated with a dashed line in figure 2, is suited to push the pawl 10 into the extended position when the bistable elastic device 40 is in a first predetermined stable configuration, illustrated in the figure; and to hold the pawl in a retracted position when the bistable elastic device 40 is in a second predetermined stable configuration, known and not illustrated, in which the flat spring 42 is in the configuration illustrated with hatching.

**[0029]** The pawl 10 is held by the body 6 sliding transversely to the striking plate 8 and the second flat spring 42 is made of an electrically conductive material, and holds a first electric contact element 62, which is suited to cooperate, in one of the stable configurations of the bistable elastic device 40, with a second electric contact element 63 held in a fixed position by the body 6.

**[0030]** In use, supplying current, for example to the first half 21b of the cable 21, produces the shortening of this half; consequently the drum 28 is dragged in rotation by the tension exerted by the half 21b of the cable 21 in such a way as to push the spring 42 with the cam means 31, altering the stable configuration assumed at that moment by the bistable elastic device 40; this will consequently snap into its second stable position, determining the passage of the flat spring 42 for example from the position illustrated with hatching to the one illustrated with a continuous line, in which it holds the pawl 10 in the extended position, blocking the plate 8 and, consequently, the door of the electrical household appliance.

**[0031]** To release the door it is necessary to supply electric current to the half 21a of the cable 21; this will obtain, in a similar way to the one already described, the passage of the bistable elastic device 40 into the original

stable configuration, with the spring 42 in the configuration illustrated with hatching, with consequent positioning of the pawl 10 in retracted position, which frees the plate 8.

## Claims

1. Blocking device (1) for the door of an electric household appliance, in particular for the door of a front-loading washing machine, comprising a body (6) that can be assembled to a frame of the electric household appliance, laterally to a door to be blocked, a striker in the form of a striking plate (8) held sliding by the body perpendicular to the door and suited to cooperate in use with a notch (9) of the door, a pawl (10) for blocking the sliding of the striking plate (8), and control means (11) for selectively moving the pawl, said control means (11) comprising an actuator (20) made of a shape memory alloy, means (22) for supplying electric power, and cam means (31) activated by said actuator (20) and acting on a bistable elastic device (90); **characterised in that:**

i. said control means (11) move said pawl between an extended position and a retracted position in/from a corresponding through perforation (13) in the striking plate;

ii. said actuator (20) including an electrically conductive resistive wire (21) made of said shape memory alloy in such a way as to be able to vary its own length as an effect of its variation in temperature;

iii. said means (22) for supplying electric power supply electric power to said resistive wire (21) and are suited to determine its controlled variation in temperature by joule effect; and

iv. said actuator (20) also includes a drum (28) held idle by said body (6) and on which said resistive wire is wound around the circumference, the drum holding angularly integral said cam means (31) acting on the bistable elastic device (40), which cooperates directly with said pawl to shift it selectively between the extended and the retracted position.

2. Device (1) according to claim 1, **characterised in that** said means (22) for supplying electric power to said resistive wire (21) comprise means (27) for intermediate bridging of the resistive wire suited to determine said controlled temperature variation only on, selectively, a first and a second portion (21a, 21b) of the same.

3. Device (1) according to claim 1 or 2, **characterised in that** said drum (28) is fitted rotating around an axis (B) contained in a plane parallel to a plane on which lies said striking plate (8); said cam means

(31) extending radially projecting in cantilever fashion from said drum (28).

4. Device (1) according to claim 3, **characterised in that** said means (27) for intermediate bridging are suited to produce said controlled temperature variation selectively along a first and a second half (21a, 21b) of said resistive wire (21); and **in that** they consist of a first flat spring (35), made of an electrically conductive material and connected to a first electric contact (36) which protrudes externally from said body, which first flat spring (35) is connected integrally to the drum (28) so as to pinch said resistive wire (21) in the respective middle of the wire and the drum themselves.
5. Device (1) according to any one of the previous claims, **characterised in that** said pawl (10) is directly controlled by said bistable elastic device (40), which cooperates with said cam means (31).
6. Device (1) according to claim 5, **characterised in that** said bistable elastic device (40) comprises a first flat spring (41) and a second flat spring (42) connected together at the respective free ends of the same, adjacent to each other, by a toggle-shaped coupling spring (43), in particular in the shape of an upside-down U, and hinged on the side opposite said free ends of the first and second flat spring (41,42).
7. Device (1) according to claim 6, **characterised in that** said pawl (10) is directly anchored to said second flat spring (42), which is suited to push it into the extended position when said bistable elastic device (40) is in a first predetermined stable configuration; and to hold said pawl (10) in said retracted position when said bistable elastic device (40) is in a second predetermined stable configuration; the pawl (10) being held by the body (6) sliding transversely to said striking plate.
8. Device (1) according to claim 7, **characterised in that** said second flat spring (42) is made of an electrically conductive material, and holds a first electric contact element (62), cooperating selectively, in one of said stable configurations of said bistable elastic device (40), with a second electric contact element (63) held in a fixed position by said body (6).

#### Patentansprüche

1. Blockiervorrichtung (1) für die Tür eines elektrischen Haushaltgeräts, insbesondere für die Tür einer Frontlade-Waschmaschine, welche Folgendes aufweist: ein Gehäuse (6), welches an einem Rahmen des elektrischen Haushaltgeräts, seitlich an einer zu blockierenden Tür, montiert werden kann, ein Ver-

riegelungsstück in der Form eines Schließbleches (8), welches von dem Gehäuse gleitend senkrecht zu der Tür gehalten wird und geeignet ist, in Gebrauch mit einem Rastelement (9) der Tür zusammenzuwirken, eine Klinke (10) zum Blockieren des Gleitens des Schließbleches (8) und Steuerungsmittel (11) zum selektiven Bewegen der Klinke, wobei die Steuerungsmittel (11) einen Aktuator (20), der aus einer Formgedächtnislegierung hergestellt ist, Mittel (22) zum Zuführen von elektrischem Strom und Nockenmittel (31), die durch den Aktuator (20) aktiviert werden und auf eine bistabile elastische Vorrichtung (40) einwirken, aufweist; **dadurch gekennzeichnet, dass:**

- i. die Steuerungsmittel (11) die Klinke zwischen einer vorgeschobenen Position und einer zurückgezogenen Position in/aus einer entsprechenden durchgehenden Ausnehmung (13) in dem Schließblech bewegen;
- ii. der Aktuator (20) einen elektrisch leitenden Widerstandsdraht (21) aufweist, der aus der Formgedächtnislegierung hergestellt ist, derart, dass er seine eigene Länge infolge seiner Temperaturänderung verändern kann;
- iii. die Mittel (22) zum Zuführen von elektrischem Strom dem Widerstandsdraht (21) elektrischen Strom zuführen und geeignet sind, seine gesteuerte Temperaturänderung durch den Joule-Effekt zu bestimmen; und
- iv. der Aktuator (20) außerdem eine Trommel (28) aufweist, die von dem Gehäuse (6) frei drehbar gehalten wird und auf welcher der Widerstandsdraht um den Umfang gewickelt ist, wobei die Trommel winkelförmig einstückig die Nockenmittel (31) hält, die auf die bistabile elastische Vorrichtung (40) einwirken, welche unmittelbar mit der Klinke zusammenwirkt, um sie selektiv zwischen der vorgeschobenen und der zurückgezogenen Position zu verschieben.

2. Vorrichtung (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Mittel (22) zum Zuführen von elektrischem Strom zu dem Widerstandsdraht (21) Mittel (27) zur Zwischenüberbrückung des Widerstandsdrahtes aufweisen, die geeignet sind, die gesteuerte Temperaturänderung selektiv nur auf einem ersten und einem zweiten Abschnitt (21a, 21b) desselben zu bestimmen.

3. Vorrichtung (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Trommel (28) drehbar um eine Achse (B) angebracht ist, die in einer Ebene enthalten ist, die parallel zu einer Ebene ist, auf welcher das Schließblech (8) liegt; wobei sich die Nockenmittel (31) von der Trommel (28) aus radial erstrecken und dabei auskragend vorstehen.

4. Vorrichtung (1) nach Anspruch 3, **dadurch gekennzeichnet, dass** die Mittel (27) zur Zwischenüberbrückung geeignet sind, die gesteuerte Temperaturänderung selektiv entlang einer ersten und einer zweiten Hälfte (21a, 21b) des Widerstandsdrahtes (21) hervorzurufen; und dadurch, dass sie aus einer ersten Flachformfeder (35) bestehen, die aus einem elektrisch leitenden Material hergestellt ist und mit einem ersten elektrischen Kontakt (36) verbunden ist, welcher aus dem Gehäuse nach außen vorsteht, wobei diese erste Flachformfeder (35) mit der Trommel (28) einstückig verbunden ist, derart, dass sie den Widerstandsdraht (21) in der jeweiligen Mitte des Drahtes und der Trommel selbst festklemmt.
5. Vorrichtung (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Klinke (10) unmittelbar von der bistabilen elastischen Vorrichtung (40) gesteuert wird, welche mit den Nockenmitteln (31) zusammenwirkt.
6. Vorrichtung (1) nach Anspruch 5, **dadurch gekennzeichnet, dass** die bistabile elastische Vorrichtung (40) eine erste Flachformfeder (41) und eine zweite Flachformfeder (42) aufweist, die an ihren jeweiligen freien Enden, die einander benachbart sind, durch eine knebelförmige Koppelfeder (43), insbesondere in der Form eines umgekehrten "U", miteinander verbunden sind und auf der Seite, die den freien Enden der ersten und zweiten Flachformfeder (41, 42) gegenüberliegt, angelenkt sind.
7. Vorrichtung (1) nach Anspruch 6, **dadurch gekennzeichnet, dass** die Klinke (10) unmittelbar an der zweiten Flachformfeder (42) verankert ist, welche geeignet ist, sie in die vorgeschobene Position zu drücken, wenn sich die bistabile elastische Vorrichtung (40) in einer ersten vorbestimmten stabilen Anordnung befindet; und die Klinke (10) in der zurückgezogenen Position zu halten, wenn sich die bistabile elastische Vorrichtung (40) in einer zweiten vorbestimmten stabilen Anordnung befindet; wobei die Klinke (10), da sie von dem Gehäuse (6) gehalten wird, quer zu dem Schließblech gleitet.
8. Vorrichtung (1) nach Anspruch 7, **dadurch gekennzeichnet, dass** die zweite Flachformfeder (42) aus einem elektrisch leitenden Material hergestellt ist und ein erstes elektrisches Kontaktelement (62) trägt, welches selektiv, in einer der stabilen Anordnungen der bistabilen elastischen Vorrichtung (40), mit einem zweiten elektrischen Kontaktelement (63) zusammenwirkt, das von dem Gehäuse (6) in einer festen Position gehalten wird.

## Revendications

1. Dispositif de blocage (1) pour la porte d'un appareil électroménager, en particulier pour la porte d'une machine à laver à chargement frontal, comprenant un corps (6) qui peut être monté sur le châssis de l'appareil électroménager latéralement par rapport à une porte qui doit être bloquée, un percuteur qui présente la forme d'une plaque de percussion (8) maintenu à coulissement par le corps perpendiculaire à la porte et conçu pour coopérer en utilisation avec une encoche (9) ménagée dans la porte, un cliquet (10) qui bloque le coulissement de la plaque de percussion (8) et des moyens de commande (11) qui déplacent de façon sélective le cliquet, lesdits moyens de commande (11) comprenant un actionneur (20) constitué d'un alliage à mémoire de forme, des moyens (22) d'alimentation en énergie électrique et des moyens à came (31) actionnés par ledit actionneur (20) et agissant sur un dispositif élastique bistable (40) **caractérisé en ce que** :
- i. lesdits moyens de commande (11) déplacent ledit cliquet entre une position déployée et une position rétractée par rapport à une perforation correspondante (13) ménagée dans la plaque de percussion,
- ii. ledit actionneur (20) comprend un fil de résistance (21) électriquement conducteur constitué dudit alliage à mémoire, de forme de telle sorte que sa longueur puisse varier en fonction de la variation de sa température,
- iii. lesdits moyens (22) d'alimentation en énergie électrique alimentent en énergie électrique ledit fil de résistance (21) et sont conçus pour déterminer par effet Joule la variation contrôlée de sa température et
- iv. ledit actionneur (20) comprenant aussi un tambour (28) maintenu à rotation libre par ledit corps (6) et autour de la circonférence duquel ledit fil de résistance est enroulé, le tambour maintenant la position angulaire desdits moyens à came (31) agissant sur le dispositif élastique bistable (40) qui coopère directement avec ledit cliquet pour le déplacer sélectivement entre la position déployée et la position rétractée.
2. Dispositif (1) selon la revendication 1, **caractérisé en ce que** lesdits moyens (22) d'alimentation en énergie électrique dudit fil de résistance (21) comprennent des moyens (27) de pontage intermédiaire dudit fil de résistance permettant de déterminer sélectivement ladite variation de température contrôlée uniquement sur une première ou une deuxième portion (21a, 21b) du fil.

3. Dispositif (1) selon les revendications 1 ou 2, **caractérisé en ce que** le tambour (29) est conçu pour tourner autour d'un axe (B) contenu dans un plan parallèle à un plan sur lequel se trouve ladite plaque de percussion (8), lesdits moyens à came (31) débordant radialement en porte-à-faux dudit tambour (28). 5
4. Dispositif (1) selon la revendication 3, **caractérisé en ce que** lesdits moyens (27) de pontage intermédiaire permettent de produire ladite variation contrôlée de température sélectivement sur une première et une deuxième moitié (21a, 21b) dudit fil de résistance (21) et **en ce qu'ils** consistent en un premier ressort plat (35) constitué d'un matériau électriquement conducteur et raccordé à un premier contact électrique (36) qui déborde hors dudit corps, ce premier ressort plat (35) étant raccordé d'un seul tenant au tambour (28) de manière à pincer ledit fil de résistance (21) respectivement au milieu du fil et au milieu du tambour. 10  
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5. Dispositif (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit cliquet (10) est directement contrôlé par ledit dispositif électrique bistable (40) qui coopère avec lesdits moyens à came (31). 25
6. Dispositif (1) selon la revendication 5, **caractérisé en ce que** ledit dispositif élastique (40) comprend un premier ressort plat (41) et un deuxième ressort plat (42) adjacents l'un par rapport à l'autre et raccordés l'un à l'autre à leur extrémité libre respective par un ressort (43) de raccordement en forme d'articulation, en particulier en forme de U tourné vers le bas et articulé sur le côté qui fait face auxdites extrémités libres du premier et du deuxième ressort plat (41, 42). 30  
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7. Dispositif (1) selon la revendication 6, **caractérisé en ce que** ledit cliquet (10) est ancré directement sur ledit deuxième ressort plat (42) qui le repousse dans la position déployée lorsque le dispositif élastique bistable (40) est dans une première configuration stable prédéterminée et qui maintient ledit cliquet (10) dans ladite position rétractée lorsque le dispositif élastique bistable (40) est dans une deuxième configuration stable prédéterminée, le cliquet (10) étant maintenu par le corps (6) coulissant transversalement vers ladite plaque de percussion. 40  
45  
50
8. Dispositif (1) selon la revendication 7, **caractérisé en ce que** ledit deuxième ressort plat (42) est constitué d'un matériau électriquement conducteur et maintient un premier élément (62) de contact électrique qui, lorsque ledit dispositif élastique bistable (40) est dans une desdites configurations stables, coopère de façon sélective avec un deuxième élément (63) de contact électrique immobilisé par ledit corps (6). 55

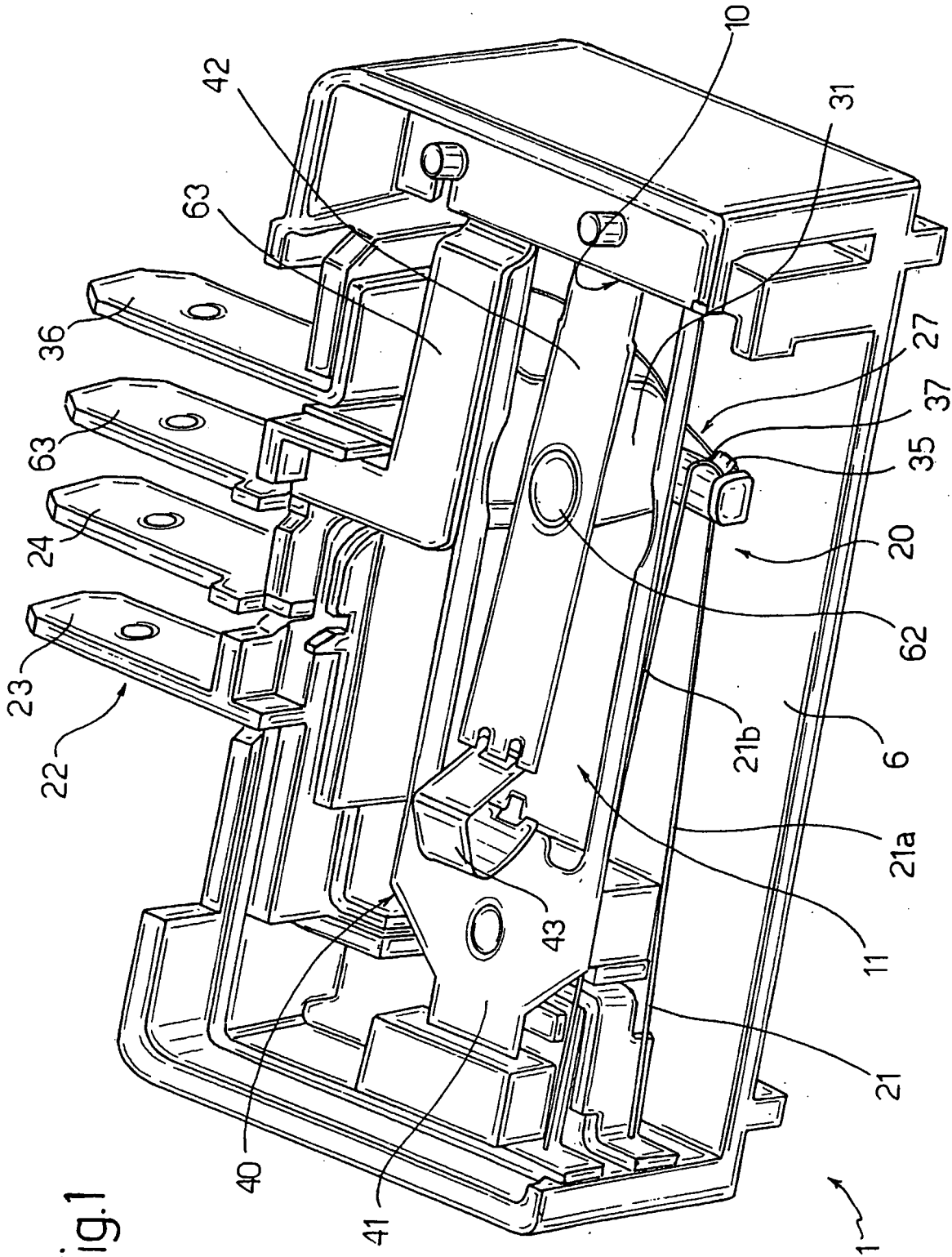


Fig.1

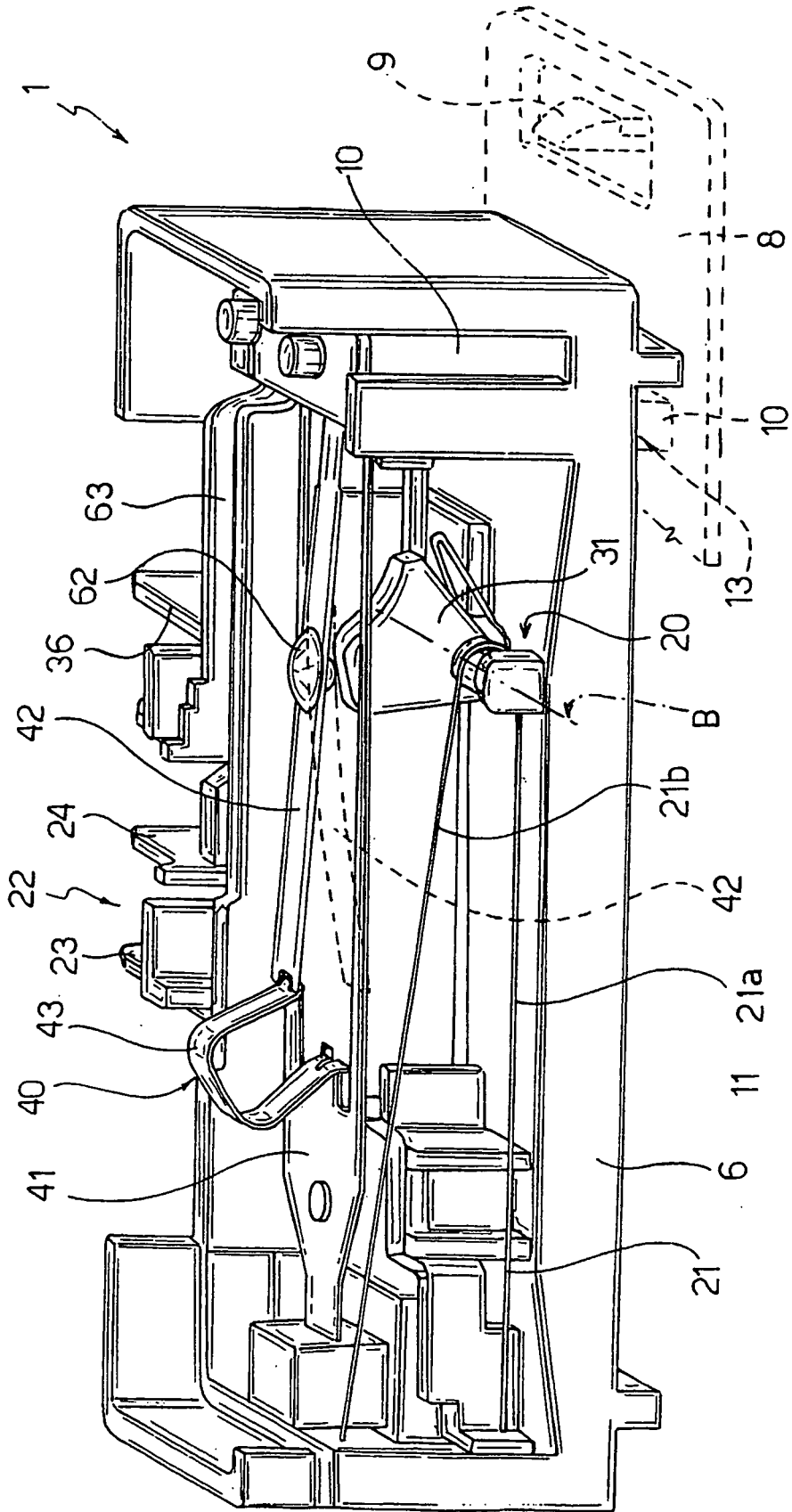


Fig.2

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- EP 1137030 A1 [0003]
- US 20040104580 A [0005]
- EP 1137030 B1 [0027]