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(54) **ADAPTIVE REFRIGERATOR CHILD LOCK SYSTEM**

(57) The present invention refers to a refrigerator door child lock system that can distinguish between a child's hand and an adult hand. The refrigerator child lock system according to the present invention preferably comprises of a microcontroller unit (MCU (1)) and a latching mechanism. The latching mechanism is configured for opening the refrigerator door based on signal received from the MCU (1). The system further includes a plurality of elastic balloons (4) with air duct (5), a constant voltage source (3) and a conductive contact (2) connected to the constant voltage source (3). The elastic balloon (4) is configured to lift the conductive contact (2) by the air filled inside the elastic balloon (4) thereby the conductive plate sends '0' voltage to the MCU (1). The elastic balloon (4) is configured to un-lift the conductive contact (2) when the air is released from the elastic balloon (4), thereby the conductive plate sends 'constant' voltage to the MCU (1). The MCU (1) is configured to send the signal to open the latching mechanism as soon as the MCU (1) reads the constant voltage from the conductive contact (2).

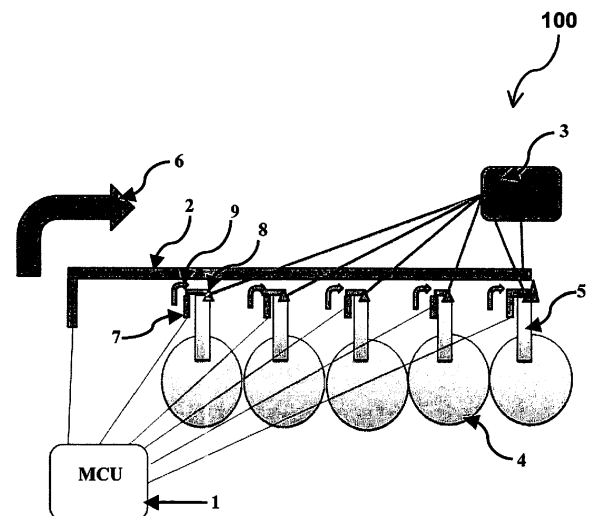


Fig. 1

Description

[0001] This invention refers to a refrigerator door child lock system according to claim 1. The invention prevents to inadmissibly open the refrigerator door by children.

Background of the Invention

[0002] Refrigerators are electronic devices mostly used to reduce temperature of food or beverages. Various methods are there for locking the refrigerator door such as password locking, locking with keys and similar techniques. However, in all the cases the refrigerator door can open to anyone who knows the password or if they have the keys to unlock the door. The locking mechanism of the refrigerator door cannot differentiate the user to whom the door has to unlock. Especially, when a child wants to open the refrigerator door, the opening of the door should to be restricted so that the parents can be sure that their child can not take anything, for example sweets or ice cream from the refrigerator without their permission. The refrigerator locking system has to differentiate the user, which means that the system allows only adults to open the refrigerator and prevents opening of the refrigerator door for children.

[0003] Prior art GB22s5734 discloses a door locking handle assembly, a cross pivot for latch lever 13 (17) is prevented from dropping or being forced out of the assembly. The pivot (17) is mounted in an end portion of lever (13) and is received in a bearing groove (19) formed in an inner portion of the lockable handle (18). A ring (26) provided with a pivot keeper (27) and a stop projection (28) is mounted in a receiving groove (21) of the shaft (20) of the handle (18) so that the cross pivot (17) is prevented by the pivot keeper (27) from moving out of the groove in a direction perpendicular to its axis. The handle is pivotally mounted in a base member (1) which is provided with a lock (33). The handle operates a bolt member (41). The latch lever (13) acts like a locking snib. Gripping it like a trigger releases the handle for rotation, unless it is locked by lock (33).

[0004] Another prior art DE3424425 relates to a door fastening, especially for chill rooms, which can be locked by means of a locking piston (1) held in the door handle (3) and a spring-loaded lock latch (4) held on the door frame (5). An electromagnet (8, 9) which can be activated by a button (24) serves for release. Moreover, the door fastening can be controlled remotely by supplying current to the electromagnet or blocking the supply of current. In an emergency or in a power failure, the lock latch (4) can be released by a mechanical actuating member (23) arranged on the inside of the door and, on the outside of the door, after the opening of a window (32), by a mechanical actuating member (33) which is coupled respectively to the lock latch (4).

[0005] The subject-matter of the prior art does not provide a door lock system that could distinguish between a child's hand and an adult hand. For this reason, in pre-

vious inventions, there is no way that can prevent children from opening the refrigerator door.

Object of the Invention

[0006] It is therefore the object of the present invention to provide a refrigerator door child lock system that can distinguish between a child's hand and an adult's hand.

Description of the Invention

[0007] The before mentioned object is solved by a refrigerator door child lock system that could distinguish between a child's hand and an adult hand according to claim 1. The refrigerator child lock system according to the present invention preferably comprises a microcontroller unit (MCU) and a latching mechanism. The latching mechanism is configured for opening the refrigerator door based on signal received from the MCU. The system further includes a plurality of elastic balloons with air duct, a constant voltage source and a conductive contact connected to the constant voltage source. The elastic balloon is configured to lift the conductive contact when the air filled inside the elastic balloon thereby the conductive plate sends '0' voltage to the MCU. The elastic balloon is configured to un-lift the conductive contact when the air released from the elastic balloon thereby the conductive plate sends 'constant' voltage to the MCU. The MCU is configured to send the signal to open the latching mechanism as soon as the MCU reads the constant voltage from the conductive contact.

[0008] This solution is beneficial since such a refrigerator child lock system can distinguish between a child's hand and an adult's hand. A force applied to the elastic balloon by the children is not sufficient to open the door and hence the access of the children is obstructed.

[0009] Further preferred embodiments are subject-matter of dependent claims and/or of the following specification parts.

[0010] According to a preferred embodiment of the present invention the refrigerator door child lock system further comprises a plurality of metal contacts and a plurality of fixed contact holders. The metal contact is fixed on top of the air duct at one corner and placed over the fixed contact holder at another corner. The constant voltage source is provided to energize each of the metal contacts that are in touch with the fixed contact holders thereby to provide lifting status of each metal contact from the elastic balloons to the MCU. Each of the elastic balloons is configured to lift the metal contact when the air is released outside the elastic balloon thereby the fixed contact holder sends '0' voltage to the MCU. The elastic balloon is configured to un-lift the metal contact when the air filled inside the elastic balloon thereby the fixed contact holder sends 'constant' voltage to the MCU. The MCU is configured to send the signal to open the latching mechanism as soon as the MCU reads the '0' voltage from the entire fixed contact holders.

[0011] According to a further preferred embodiment of the present invention, the MCU is configured not to send the signal to open the latching mechanism when the MCU reads 'constant voltage' from at least any one of the fixed contact holders. The elastic balloons are provided in a handle of the refrigerator door in a form to receive fingers of the users and to allow the user to press the elastic balloons to release air while opening the refrigerator door. The metal contacts are configured to touch the respective fixed contact holders to provide the constant voltage to the MCU thereby to prevent opening of the refrigerator door. The MCU receives the constant voltage when at least one metal contact is in touch with the respective fixed contact holder. A pressure applied on elastic balloons is required to meet a predetermined level to evacuate the air from the elastic balloons thereby to open up all the metal contacts, which in turn opens the latching mechanism of the refrigerator door. The conductive contacts are made of a lightweight conductor to allow to lift or un-lift using the elastic balloon air. The MCU is further configured to control the latching mechanism based on duration of un-lift state of the conductive contact.

[0012] Further benefits, goals and features of the present invention will be described by the following specification of the attached figures, in which components of the invention are exemplarily illustrated. Components of the devices and method according to the inventions, which match at least essentially with respect to their function can be marked with the same reference sign, wherein such components do not have to be marked or described in all figures.

[0013] The invention is just exemplarily described with respect to the attached figures in the following.

Brief Description of the Drawing

[0014]

Fig. 1 illustrates an exemplary model of a refrigerator door lock system, according to the present invention.

Detailed Description of the Drawing

[0015] Fig. 1 illustrates an exemplary model 100 of a refrigerator door lock system according to the present invention. An activation of the child lock is performed manually. That means that the child cannot open the refrigerator door when the child pulls the refrigerator from a handle to open the refrigerator door. In order to do achieve this, the present invention preferably comprises of a microcontroller unit (MCU 1) and a latching mechanism. The latching mechanism is configured for opening the refrigerator door based on signal received from the MCU 1. The system further includes a plurality of elastic balloons 4 with an air duct 5, a constant voltage source 3 and a conductive contact 2 connected to the constant voltage source 3. The elastic balloons 4 can be in a form

of five pieces of the handle of the refrigerator door. The air-filled parts of the balloons are designed to fit the fingers of a user. The user has to apply pressure to the elastic balloon 4 regions with his/her fingers by holding the handle of the door of the refrigerator with his/her hand to open the refrigerator.

[0016] Further, the elastic balloon 4 is configured to lift the conductive contact 2 by the air filled inside the elastic balloon 4, thereby the conductive plate sends '0' voltage to the MCU 1. Fig.1 shows the direction 6 of the lifting of the conductive contact 2. The elastic balloon 4 is configured to un-lift the conductive contact 2 when the air is released from the elastic balloon 4 thereby the conductive plate sends 'constant' voltage to the MCU 1. The MCU 1 is configured to send the signal to open the latching mechanism as soon as the MCU 1 reads the constant voltage from the conductive contact 2. Depend upon the duration of the lifting of the conductive plate, the supply of constant voltage to the MCU 1 ensured to activate the latching mechanism.

[0017] This solution is beneficial since such a refrigerator child lock system can distinguish between a child's hand and an adult's hand. A force applied to the elastic balloon 4 by the children is not sufficient to release the air from the elastic balloon and hence the access of the children is obstructed.

[0018] According to an embodiment of the invention, the refrigerator door child lock system further comprises a plurality of metal contacts 8, and a plurality of fixed contact holders 7. The metal contact 8 is fixed on top of the air duct 5 at one corner and placed over on the fixed contact holders 7 at another corner. The constant voltage source 3 is provided to energize each of the metal contacts 8 that are in touch with the fixed contact holders 7 thereby to provide lifting status of each metal contacts 8 from the elastic balloons 4 to the MCU 1. Each of the elastic balloons 4 is configured to lift the metal contact 8 when the air is released outside the elastic balloon 4 thereby the fixed contact holder sends '0' voltage to the MCU 1. The elastic balloon 4 is configured to un-lift the metal contact 8 by the air filled inside the elastic balloon 4 thereby the fixed contact holder sends 'constant' voltage to the MCU 1. The MCU 1 is configured to send the signal to open the latching mechanism as soon as the MCU 1 reads the '0' voltage from the entire fixed contact holders 7. Fig. 1 shows the direction 9 of lifting of the metal contact 8.

[0019] According to a preferred embodiment of the present invention the MCU 1 is configured not to send the signal to open the latching mechanism when the MCU 1 reads constant 'voltage' from at least any one of the fixed contact holders 7. Preferably, the MCU 1 can send only a signal to the latching mechanism only when both the conditions are met, that is when the MCU 1 reads the constant voltage from the conductive contact 2 and also reads the '0' voltage from all the fixed contact holders 7.

[0020] The elastic balloons 4 are provided in a handle of the refrigerator door in a form to receive fingers of the

users and to allow the user to press the elastic balloons 4 to release air while opening the refrigerator door. The metal contacts 8 are configured to touch the respective fixed contact holders 7 to provide the constant voltage to the MCU 1 thereby to prevent opening of the refrigerator door. The MCU 1 receives the constant voltage when at least one metal contact 8 is in touch with the respective fixed contact holder. A pressure applied on elastic balloons 4 is required to meet predetermined level to evacuate the air from the elastic balloons 4 thereby to open up all the metal contacts 8 which in turn to open the latching mechanism of the refrigerator door. The conductive contacts 2 are made of a lightweight conductor to allow to lift or un-lift using the elastic balloon 4. The MCU 1 is further configured to control the latching mechanism based on duration of un-lift state of the conductive contact 2.

[0021] For example, when the child wants to open the door, the pressure given by the child on to the elastic balloon 4 may not be sufficient to release the air from the elastic balloon thus it is not possible to lift all the metal contacts 8. Since at least one or two of the fixed contact holders may be in touch with the metal contact 8 and provides continuous constant voltage to the MCU 1. Therefore the MCU 1 cannot send the control signal to the latching mechanism to open the door. Thus the refrigerator door is prevented from opening.

[0022] In some case, the child may give sufficient pressure to lift the conductive contact 2. But the child cannot provide sufficient pressure for a longer duration or a predetermined duration to lift all the metal contacts 8. Thus the MCU 1 cannot read the '0' voltage from the all metal contacts 8 and hence the opening of the refrigerator door is prevented.

[0023] Thus, the refrigerator door child lock system can distinguish between a child's hand and an adult's hand compared to the known child lock systems. The refrigerator child lock system according to the present invention preferably comprises of a microcontroller unit (MCU 1) and a latching mechanism. The latching mechanism is configured for opening the refrigerator door based on signal received from the MCU 1. The system further includes a plurality of elastic balloons 4 with an air duct 5, a constant voltage source 3 and a conductive contact 2 connected to the constant voltage source 3. The elastic balloon 4 is configured to lift the conductive contact 2 when the air filled inside the elastic balloon 4 thereby the conductive plate sends '0' voltage to the MCU 1. The elastic balloon 4 is configured to un-lift the conductive contact 2 when the air released from the elastic balloon 4 thereby the conductive plate sends 'constant' voltage to the MCU 1. The MCU 1 is configured to send the signal to open the latching mechanism as soon as the MCU 1 reads the constant voltage from the conductive contact 2.

List of reference numbers

[0024]

- 1 microcontroller unit (MCU)
- 2 conductive contact
- 3 constant voltage source
- 4 elastic balloons
- 5 air duct
- 6 direction of lifting of the conductive contact
- 7 fixed contact holder
- 8 metal contact
- 9 direction of lifting of the metal contact

Claims

1. A refrigerator door child lock system comprising a microcontroller unit (MCU) (1) and a latching mechanism, wherein the latching mechanism is configured to open the refrigerator door based on signal received from the MCU (1), wherein the system further includes a plurality of elastic balloons (4) with an air duct (5), a constant voltage source (3) and a conductive contact (2) connected to the constant voltage source (3), wherein the elastic balloon (4) is configured to lift the conductive contact (2) by the air filled inside the elastic balloon (4), thereby the conductive plate sends '0' voltage to the MCU (1), wherein the elastic balloon (4) is configured to un-lift the conductive contact (2) by the air released from the elastic balloon (4), thereby the conductive plate sends 'constant' voltage to the MCU (1), wherein the MCU (1) is configured to send an signal to open the latching mechanism as soon as the MCU (1) reads the constant voltage from the conductive contact (2).
2. The refrigerator door child lock system as claimed in claim 1, wherein the refrigerator door child lock system further comprises a plurality of metal contacts (8), and a plurality of fixed contact holders (7) wherein the metal contact (8) is fixed on top of the air duct (5) at one corner and is placed over the fixed contact holder (7) at another corner, wherein the constant voltage source (3) is provided to energize each of the metal contacts (8) that are in touch with the fixed contact holders (7), thereby to provide lifting status of each metal contacts (8) from the elastic balloons (4) to the MCU (1), wherein each of the elastic balloons (4) is configured to lift the metal contact (8) when the air is released outside the elastic balloon (4), thereby the fixed contact holder sends '0' voltage to the MCU (1), wherein the elastic balloon (4) is configured to un-lift the metal contact (8) when the air is filled inside the elastic balloon (4), thereby the fixed contact holder sends 'constant' voltage to the MCU (1), wherein the MCU (1) is configured to send the signal

to open the latching mechanism as soon as the MCU (1) reads the '0' voltage from all the fixed contact holders (7).

3. The refrigerator door child lock as claimed in claim 2, wherein the MCU (1) is configured not to send the signal to open the latching mechanism when the MCU (1) reads constant voltage from at least any one of the fixed contact holders (7). 5
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4. The refrigerator door child lock system as claimed in claim 1, wherein the elastic balloons (4) are provided in a handle of the refrigerator door in a form to receive hand fingers of the users and to allow the user to press the elastic balloons (4) to release air while opening the refrigerator door. 15
5. The refrigerator door child lock system as claimed in claim 1, wherein the metal contacts (8) are configured to touch the respective fixed contact holders (7) to provide the constant voltage to the MCU (1), thereby to prevent opening of the refrigerator door. 20
6. The refrigerator door child lock system as claimed in claim 1, wherein the MCU (1) receives the constant voltage when at least one metal contact (8) is in touch with the respective fixed contact holder (7). 25
7. The refrigerator door child lock system as claimed in claim 1, wherein pressure applied on elastic balloons (4) is required to meet a predetermined level to evacuate the air from the elastic balloons (4), thereby to open up all the metal contacts (8) which in turn opens the latching mechanism of the refrigerator door. 30
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8. The refrigerator door child lock as claimed in claim 1, wherein the conductive contacts (2) are made of a lightweight conductor to allow to lift or un-lift using the elastic balloon (4) air. 40
9. The refrigerator door child lock as claimed in claim 1, wherein the MCU (1) is configured to control the latching mechanism based on duration of un-lift state of the conductive contact (2). 45

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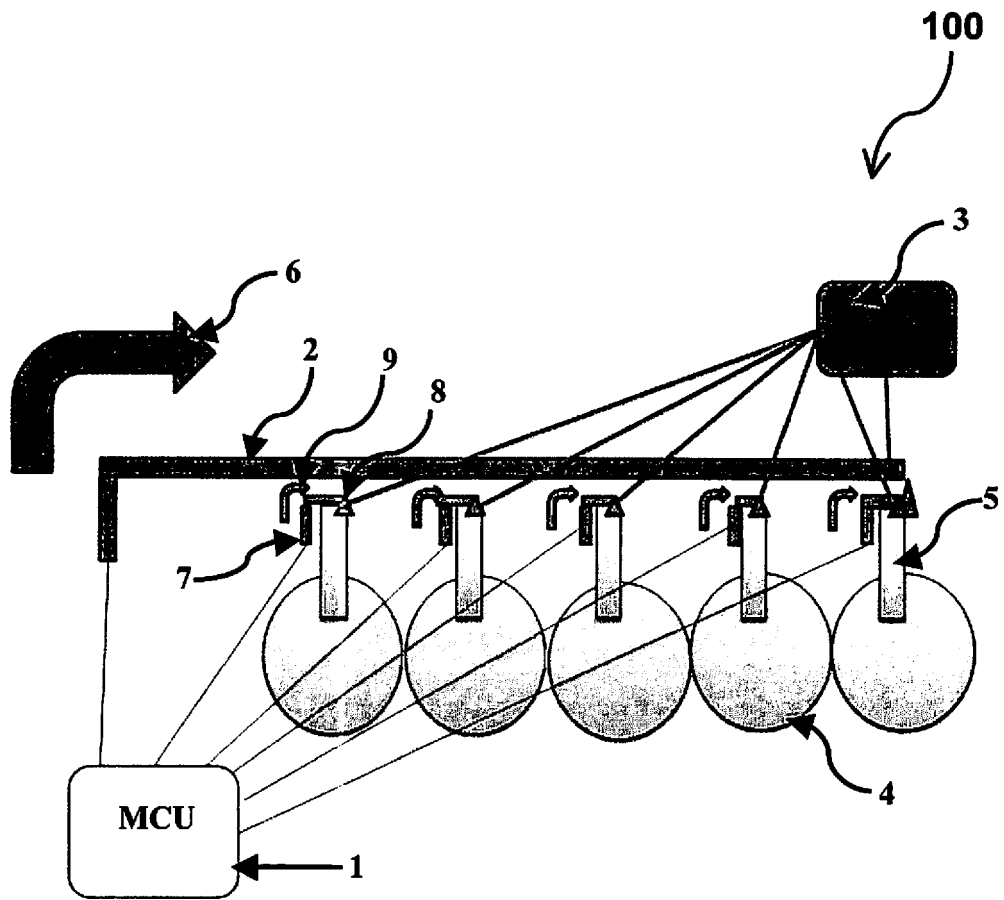


Fig. 1



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 EP 17 20 7966

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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