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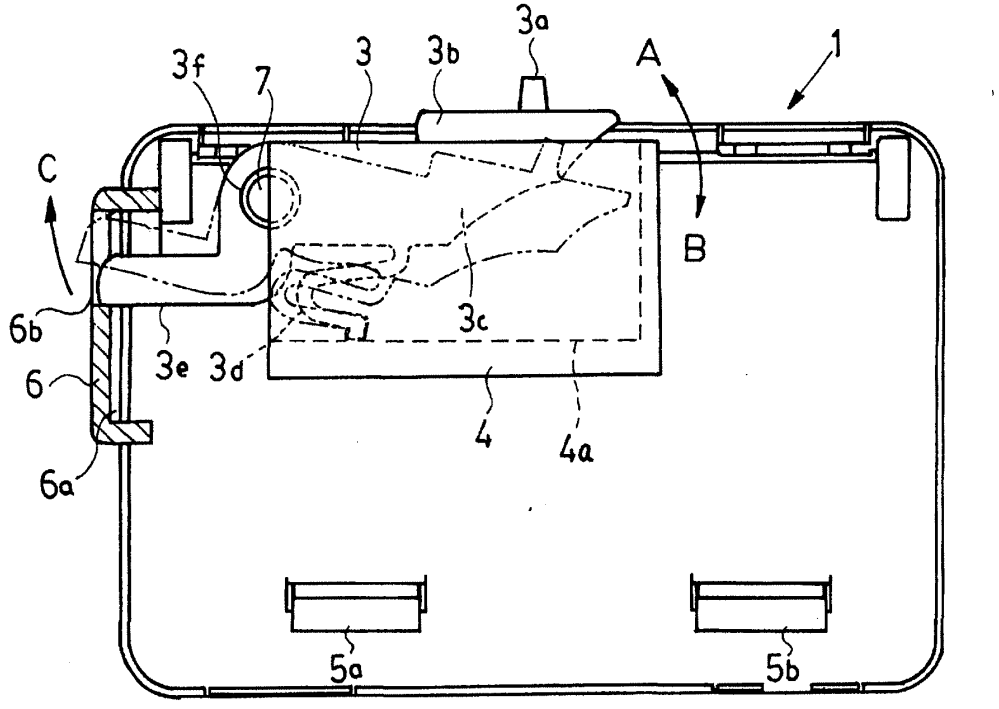
(54) ELECTRONIC SHELF TAG

(57) An electronic shelf tag (1) is provided, as fixing means for removably fixing the tag (1) to a rail provided to a merchandise shelf, with a fitting section (3b), hooks (5a, 5b), and a spring (3d), where the fitting section (3b) and the hooks (5a, 5b) are fitted in grooves provided in a side face of the rail and the spring (3d) urges the fitting section (3b). The electronic shelf tag (1) is further provided with a key hole (6a) and an arm (3e). The key hole (6a) allows a thin platelike key to be inserted therein to releases the fixation of the tag (1) to the rail by the fixing means. The arm (3e) is provided at a position at which the arm (3e) makes contact with the key inserted to the key hole (6a), is moved by a load applied to the key in response to the insertion of the key, and moves the fitting section (3b) in a direction in which the fitting section (3b) is separated from the rail against urging by the spring.

Figur 3



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Description

Technical Field

[0001] The invention relates to an electronic shelf label displaying information related to a product, such as a product name and a product price, by an electrically driven display panel.

Background Art

[0002] In recent years, electronic shelf labels having an electrically driven display panel are beginning to be used in stores such as supermarkets and retail shops, instead of paper or plastic price tags on which the price of a product, a product name, and/or the like are written or printed.
Such an electronic shelf label uses, for example, a liquid crystal panel as a display panel, and displays on this display panel information related to a product, such as a product name and a product price.

[0003] For example, when product pricing is changed, arrangements of products are moved, or new products are newly laid out, the above-described paper or plastic price tags require a laborious operation for replacing price tags. On the other hand, in the electronic shelf label, the information displayed on the display panel can be easily changed while it is placed on a product shelf, and thus a work load on a shop clerk can be reduced largely. Further, for example, when a time-limited sales is held, the pricing of sales items can be changed quickly from normal pricing to sales pricing, thereby allowing to sell products without missing a sales opportunity.
For such an electronic shelf label, in addition to having the above-described advantages, price reduction is in progress due to decrease in unit price of liquid crystal panels, and its introduction cost is also decreasing. Thus, further popularization is expected from now on.

[0004] Incidentally, many of conventional electronic shelf labels are, for example, ones structured to be inserted and attached via an end of a rail provided on the front end face of a product shelf as the art described in PTL1, or ones provided with hooks on a rear face part for engaging an upper and a lower end inside a rail and attached by fitting the hooks in the rail as the art described in PTL2. However, these electronic shelf labels are easily attachable to and detachable from the rail and, since liquid crystal panels are valuable precision machines which can be reused for or diverted to other things, there has been a problem that the labels are liable to be stolen.

[0005] As an art to address such a problem, as described in Patent Document 3 for example, one providing an electronic shelf label with a movable pin as a member for engaging with a rail is known. The electronic shelf label described in PTL3, when being attached to the rail, is fitted in the rail with the pin being pushed inside, and the push is released at a predetermined position to allow the pin to project from the main body to be inserted in a hole provided in the rail, thereby firmly fixing the label to the rail. On the other hand, when it is to be removed, a release tool having a magnet is placed closely, which draws the pin into the main body by magnetic force to pull the pin out of the hole provided in the rail, thereby releasing fixation to the rail. Therefore, it is possible to achieve, to a certain degree, both easiness of attaching to and detaching from the rail and prevention of theft by unauthorized removal.

Summary of Invention

Technical Problem

[0006] However, the electronic shelf label described in PTL3 has following problems.
First, since the magnet is used for removal, there is a risk of electromagnetic interference occurring in a control circuit or the like by the use of the magnet. Further, the release tool having the magnet has a large size and a heavy weight and hence is of poor portability. Moreover, the part to which magnetic force operates is formed of metal, and thus, when the electronic shelf label is provided with a wireless communication function, the metal may cause interference in wireless communication.
Therefore, with the art described in PTL3, it has not been possible to achieve an electronic shelf label which has sufficient usability.

[0007] Further, as other means for preventing theft, it is also conceivable to provide a mechanism to sound a warning buzzer in the event of removal from the rail, or enhance the fixing strength to the rail by the hooks. However, in the former case, even when a clerk of a store having electronic shelf labels removes electronic shelf labels, a complicated operation of stopping the buzzer sound occurs every time of removal. In the latter case, there is a problem that it is difficult to be removed by a clerk, and operation efficiency decreases significantly.
Thus, the conventional electronic shelf labels described above all have a problem that both the easiness of attachment to and detachment from a product shelf and the theft prevention are not achieved sufficiently.

[0008] The invention is made in view of the above-described points, and an object thereof is to enable to prevent theft of an electronic shelf label without impairing an advantage of easiness of attachment to and detachment from a product shelf.

Solution to Problem

[0009] To achieve the above described object, the invention provides an electronic shelf label displaying information related to a product by an electrically driven display panel, including: as fixing means for detachably fixing the electronic shelf label to a rail provided on a product shelf, a first and a second engagement portions for engaging with an engagement portion provided on a side face of the rail; and an applying means for applying

force to the first engagement portion in a direction toward the side face of the rail in a state of being fixed to the rail, and further including: a key hole into which a thin plate-shaped key for releasing fixation of the electronic shelf label to the rail by the fixing means is inserted; and an arm portion provided at a position abutting on the key inserted in the key hole, the arm portion being displaced by a load applied by the key in response to insertion of the key and, accompanying this displacement, displacing the first engagement portion in a direction to depart from the side face of the rail against the bias by the applying means.

[0010] In such an electronic shelf label, it is preferable that the key hole is formed such that the key is inserted substantially perpendicularly to a bottom face of the rail and in a direction along a side face of the electronic shelf label perpendicular to a longitudinal direction of the rail. Further, it is preferable that the key has a shape which becomes narrower toward a front end thereof at least within a range in which the key abuts on the arm portion when being inserted in the key hole, the force applied by the applying means acts on the arm portion, and when the key is inserted into the key hole, the arm portion is displaced by the key in a manner to be pushed outward with respect to the insertion direction against the force as the key is inserted.

[0011] Furthermore, it is preferable that, in a state of being inserted into the key hole until the first engagement portion is displaced to a degree of being released from the engagement portion of the rail, the key is retained between the arm portion and a wall face of the key hole by the force applied by the applying means, and in this state, it is possible to remove the electronic shelf label from the rail using the key as a handle.

[0012] Moreover, it is preferable that the first engagement portion and the arm portion are an integrated member rotatably fixed to a rear face side of the electronic shelf label, and when the arm portion abuts on the key and is pushed outward, the member rotates to displace the first engagement portion in a direction to depart from the side face of the rail.

Alternatively, it is preferable that the first engagement portion and the arm portion are an integrated member held on a rear face side of the electronic shelf label in a manner slidable along the rear face, and when the arm portion abuts on the key and is pushed outward, the member slides along the rear face of the electronic shelf label to displace the first engagement portion in a direction to depart from the side face of the rail.

[0013] Further, it is preferable that an obstacle is provided on an inner wall of the key hole, so that only a key having a groove or a cutout corresponding to the obstacle can be inserted into the key hole.

Furthermore, it is preferable that the rail is provided, on the side face corresponding to the first engagement portion, with a groove which internally includes a hole, as the engagement portion, and the first engagement portion engages with the groove, and includes a guide pin to be inserted into the hole in the groove.

Moreover, it is preferable that an exterior including the first and the second engagement portions, the arm portion, the applying means, and the key hole is formed of resin.

Advantageous Effects of Invention

[0014] With an electronic shelf label according to the present invention, theft can be prevented without impairing an advantage of easiness of attachment to and removal from a product shelf.

Brief Description of Drawings

[0015]

[Fig. 1] Fig. 1 is an external perspective view of a front face side of an electronic shelf label of a first embodiment of the invention.

[Fig. 2] Fig. 2 is an external perspective view of a rear face side of the electronic shelf label of the first embodiment of the invention.

[Fig. 3] Fig. 3 is a view for describing operation of members provided on the rear face side of the electronic shelf label of the first embodiment of the invention.

[Fig. 4A] Fig. 4A is a perspective view illustrating an external appearance of a key used for the electronic shelf label of the first embodiment of the invention.

[Fig. 4B] Fig. 4B is a side view of the same.

[0016]

[Fig. 5A] Fig. 5A is an explanatory view of a procedure in the case of fixing the electronic shelf label of the first embodiment of the invention to a rail.

[Fig. 5B] Fig. 5B is an explanatory view of a procedure and a fixing state in the case of fixing the same electronic shelf label to the rail.

[Fig. 6A] Fig. 6A is an explanatory view of a procedure in the case of removing the electronic shelf label of the first embodiment of the invention from the rail.

[Fig. 6B] Fig. 6B is an explanatory view illustrating a continuation thereof.

[Fig. 6C] Fig. 6C is an explanatory view illustrating a further continuation thereof.

[Fig. 7] Fig. 7 is an external perspective view of a rear face side corresponding to Fig. 2 of an electronic shelf label of a second embodiment of the invention.

[0017]

[Fig. 8] Fig. 8 is an explanatory view corresponding to Fig. 3 of the electronic shelf label of the second embodiment of the invention.

[Fig. 9] Fig. 9 is a rear view corresponding to Fig. 8 and illustrating a structure of a modification example

of the invention.

[Fig. 10A] Fig. 10A is a front view of a key hole in an electronic shelf label of another modification example of the invention.

[Fig. 10B] Fig. 10B is a view illustrating another example thereof.

[Fig. 10C] Fig. 10C is a view illustrating still another example thereof.

[Fig. 10D] Fig. 10D is a view illustrating still another example thereof.

[Fig. 10E] Fig. 10E is a view illustrating still another example thereof.

Reference Signs List

[0018] 1 and 31: electronic shelf label; 2: display panel; 3 and 33: lock plate; 3a and 33a: guide pin; 3b and 33b: engagement portion; 3c, 3e, 33c and 33e: arm portion; 3d and 33d: spring portion; 3f: shaft hole; 4 and 34: housing rack; 4a and 34a: housing portion; 5a, 5b, 35a and 35b: hook; 6 and 36: key attaching portion; 6a and 36a: key hole; 6b and 36b: slit; 6c: projection; 7: shaft; 8: housing portion; 10: key; 10a: front end portion; 10b: rear end portion; 20: rail; 20a and 20c: groove; 20b: hole; 20d: eaves; 33g: shaft; 38: spring stopping portion; 40: spring

Description of Embodiments

[0019] Hereinafter, embodiments for carrying out the invention will be described specifically based on the drawings.

[First Embodiment: Fig. 1 to Fig. 6C]

[0020] First, a schematic structure of a first embodiment of an electronic shelf label of the invention will be described. Note that in the following description, directions such as "upward", "downward", and the like indicate directions in the drawings, and do not necessarily match the directions when the electronic shelf label is in use.

[0021] Fig. 1 and Fig. 2 are respectively external perspective views of a front face side and a rear face side of an electronic shelf label 1, which is the first embodiment of the electronic shelf label of the invention.

The electronic shelf label 1 illustrated in Fig. 1 has a display panel 2 in a front face. This display panel 2 is an electrically driven display means for displaying information related to a product, such as a product name and price, and is formed of a liquid crystal panel here. Further, inside the electronic shelf label 1, there is provided a control unit (omitted from illustration) realized by a microcomputer constituted of a CPU, a ROM, and a RAM, and this control unit performs display control processing of the display panel 2. This control unit is housed in a housing portion 8.

[0022] On the other hand, on a rear side of the electronic shelf label 1, fixing means for detachably fixing this electronic shelf label 1 to a rail provided on a product shelf for displaying products are provided.

As illustrated in Fig. 2, a first fixing means is a lock plate 3 attached to an upper portion of a rear face side. When this electronic shelf label 1 is fixed to the rail (which will be described later) of the product shelf, an engagement portion 3b and a guide pin 3a are fitted in a groove which is an engagement portion provided in the rail and a hole provided in the groove, respectively, to allow engagement therebetween. Then, by this engagement, the electronic shelf label 1 is fixed so as not to disengage from the rail and also not to move on the rail along the rail.

[0023] This lock plate 3 is rotatable about a shaft 7 with the shaft 7 being a fulcrum, and when an arm portion 3e is rotated and displaced upward in the view, the engagement portion 3b and the guide pin 3a are rotated and displaced downward in the view to be in a state of being housed in a housing rack 4. Among them, the engagement portion 3b corresponds to a first engagement portion.

[0024] A second fixing means is two hooks 5a and 5b provided on a lower portion of the rear face, and front end portions thereof are hooked on and engaged with an engagement portion provided on a side face of the rail of the product shelf opposite to the groove with which the engagement portion 3b is engaged, to thereby fix the electronic shelf label 1 so as not to disengage from the rail. These hooks 5a and 5b correspond to a second engagement portion.

[0025] Further, on a side face of the electronic shelf label 1, there is provided a key attaching portion 6 in which a key is inserted for releasing the fixation by the lock plate 3 to remove the electronic shelf label 1 from the rail.

An exterior of this electronic shelf label 1 including the lock plate 3, the hooks 5a, 5b, and the key attaching portion 6 is formed entirely of resin, but may be formed of different materials including metal.

[0026] Next, structures of the lock plate 3 and the key attaching portion 6, which are characteristic of the electronic shelf label 1 as described above, will be described further also using Fig. 3.

Fig. 3 is a view for describing operation of members provided on the rear face side of the electronic shelf label 1. In Fig. 3, the housing portion 8 is omitted from illustration, and the key attaching portion 6 is illustrated in a partially cut away state.

[0027] As illustrated in Fig. 3, the lock plate 3 is an integrally molded member made up of an arm portion 3c having the above-described guide pin 3a and engagement portion 3b, a spring portion 3d, and the other arm portion 3e, and has a shaft hole 3f between the arm portions 3c and 3e. Then, by fitting the shaft hole 3f with the shaft 7 provided on the rear face of the electronic shelf label 1 to attach the lock plate, the lock plate 3 is made rotatable about the shaft 7.

[0028] Further, the spring portion 3d of the lock plate 3 is provided on a lower side of the arm portion 3c in the view, and a front end portion thereof abuts on a bottom

face inside the housing rack 4. Then, the spring portion 3d functions as an applying means for applying force to the arm portion 3c of the lock plate 3 from the lower side thereby applying force in arrow A direction. In addition, the spring portion 3d may be fixed to the bottom face inside the housing rack 4.

[0029] The other arm portion 3e of the lock plate 3 has a front end portion inserted in a slit 6b of the key attaching portion 6. When no external force acts on the lock plate 3, the lock plate 3 rotates in the arrow A direction to a position where a lower face of the arm portion 3e abuts on a lower face of the slit 6b by the force from the spring portion 3d. At this point, the lock plate 3 stops at a position, as illustrated in Fig. 2, preferable for engaging the guide pin 3a and the engagement portion 3b with the groove provided in the rail (this position is illustrated with solid lines (a portion hidden by the housing rack 4 is illustrated with dashed line) in Fig. 3).

[0030] On the other hand, the key attaching portion 6 has a key hole 6a which is provided on a side face of the electronic shelf label 1 perpendicular to the longitudinal direction of the rail in the state of being fixed to the rail, and in which a thin plate-shaped key is inserted, and the above-described slit 6b for restricting the movable range of the arm portion 3e. Here, the key hole 6a is formed so that the key is inserted thereinto in a direction substantially perpendicular to the bottom face of the rail and along the side face of the electronic shelf label 1. By thus forming the key hole 6a, the key can be inserted from a front face of the electronic shelf label 1. Even when plural electronic shelf labels 1 are aligned and fixed to the rail, insertion of the key does not become difficult by an adjacent electronic shelf label 1, and the key can be inserted easily.

[0031] As will be described later, when a load in arrow C direction in the view is applied to the arm portion 3e by the key inserted into the key hole 6a of the key attaching portion 6, the arm portion 3e is displaced in the arrow C direction in the view against the force from the spring portion 3d, and accompanying this, the lock plate 3 rotates in arrow B direction in the view about the shaft 7. Then, by displacing the lock plate 3 to the position denoted by two-dot chain lines in the view for example, the positions of the guide pin 3a and the engagement portion 3b can be moved to a position lower than an upper face the main body of the electronic shelf label 1, and engagement with the groove provided in the rail can be released. Moreover, the arm portion 3c of the lock plate 3 is housed in the housing rack 4, and the front end portion of the other arm portion 3e is inserted in the slit 6b, thereby making the lock plate 3 less likely to be dropped from the shaft 7.

[0032] Next, the key to be inserted into the key hole 6a of the electronic shelf label 1 will be described.

Fig. 4A is an external perspective view of the key, and Fig. 4B is a side view of the same.

The key 10 is a flat plate-shaped member made of resin for example and is, as illustrated in Fig. 4A, a flat thin plate member having a thickness which is about equal to the width of the key hole 6a of the electronic shelf label 1.

Further, when the key 10 is inserted in the key hole 6a, an upper face of the key abuts on the lower face of the arm portion 3e of the lock plate 3, but as illustrated in Fig. 4B, in a longitudinal direction, the key has a shape which becomes narrower toward its front end within a range in which a front end portion 10a abuts on the lower face of the arm portion 3e of the lock plate 3.

[0033] Next, a method of fixing the electronic shelf label 1 to a rail provided on a product shelf and operation of the lock plate 3 in this fixing will be described.

Fig. 5A and Fig. 5B are explanatory views of a procedure and a fixing state in the case of fixing the electronic shelf label 1 to the rail. Fig. 5A illustrates a state where a lower portion of the electronic shelf label 1 is inserted in a lower side of the rail, and Fig. 5B illustrates a state where the fixing of the electronic shelf label 1 to the rail is completed. In these views, the rail is illustrated as a cross section.

[0034] As illustrated in Fig. 5A, on a side face of an upper side of the rail 20, a groove 20a which is the engagement portion for engaging with the engagement portion 3b of the lock plate 3 of the electronic shelf label 1 is provided, and plural holes 20b for fitting the guide pin 3a are provided in a bottom of the groove 20a at predetermined intervals in a longitudinal direction of the rail 20. Further, a side face of a lower side of the rail 20, a groove 20c which is the engagement portion for engaging with the hooks 5a and 5b of the electronic shelf label 1 is provided.

[0035] When the electronic shelf label 1 is fixed to the rail 20 as described above, first, front ends of the hooks 5a and 5b are inserted in and engaged with the groove 20c on the lower side of the rail 20, as illustrated in Fig. 5A. Thereafter, the guide pin 3a of the electronic shelf label 1 is brought to abut on eaves 20d of the upper side of the rail 20, and force is applied to press an upper portion of the electronic shelf label 1 in arrow D direction in the view, so as to push the upper portion of the electronic shelf label 1 into the rail 20. Then, the guide pin 3a is pressed gradually by an inclined face of the eaves 20d, and the arm portion 3c provided with the engagement portion 3b and the guide pin 3a of the lock plate 3 is gradually pushed down in a downward direction in the view against the force from the spring portion 3d (rotates about the shaft 7 illustrated in Fig. 7).

[0036] When the position of the guide pin 3a reaches the position of the groove 20a of the rail 20, pressing by the eaves 20d is released, and thus the arm portion 3c of the lock plate 3 moves upward in the view, that is, the direction to be pushed out into the groove 20a provided in the side face of the rail 20, by the force from the spring portion 3d, thereby the engagement portion 3b and the rail 20 engage with each other. In this state, the electronic shelf label 1 is in a state of being fixed slidably in the longitudinal direction in the rail 20.

[0037] Thereafter, in this state, when the electronic

shelf label 1 is slid slightly in the longitudinal direction of the rail to align the positions of the guide pin 3a and the hole 20b, the guide pin 3a fits in the hole 20b as illustrated in Fig. 5B, and the arm portion 3c of the lock plate 3 is pushed up to the position denoted by solid lines in Fig. 3 by the force from the spring portion 3d. In this state, the electronic shelf label 1 is in a state of being fixed non-slidably in the longitudinal direction in the rail 20.

[0038] Such operation to fix the electronic shelf label 1 to the rail 20 can be performed easily by one hand, and thus the fixing operation can be performed efficiently.

Further, when the electronic shelf label 1 is fixed in the rail 20 in a state where the guide pin 3a is fitted in the hole 20b, it becomes difficult either to pull out the electronic shelf label 1 to a near side to remove it, or to slide the electronic shelf label along the longitudinal direction of the rail 20 to remove it via an end of the rail 20. Thus, theft can be prevented effectively.

[0039] Next, a method of removing the electronic shelf label 1 from the rail of the product shelf and operation of respective parts of the electronic shelf label 1 in this removal will be described.

Fig. 6A to Fig. 6C are views for describing a procedure in the case of removing the electronic shelf label 1 from the rail. Fig. 6A is a side view illustrating a state before the key is inserted into the key hole of the electronic shelf label, Fig. 6B is a side view illustrating a state in the middle of inserting the key into the key hole, and Fig. 6C is a side view illustrating a state in the middle of removing the electronic shelf label from the rail after inserting the key into the key hole. Note that each rail in these views is illustrated as a cross section, and in Fig. 6B, also the key attaching portion is illustrated in a state of being cut away to make the inside visible.

[0040] To remove the electronic shelf label 1 fixed to the rail 20 from the rail 20, as illustrated in Fig. 6A, the key 10 is inserted into the key hole 6a from the front end portion 10a in arrow E direction in the view with its inclined face of the front end portion 10a of the key 10 directed upward,.

When the front end portion 10a is inserted gradually deeper in the key hole 6a, and as illustrated in Fig. 6B, the inclined face of the front end portion 10a abuts on the lower face of the arm portion 3e of the lock plate 3 arranged deep in the key hole 6a, a thrust load to push upward as shown by arrow F is applied to the arm portion 3e from the inclined face of the front end portion 10a as the key 10 is inserted. Then, by this thrust load, the arm portion 3e is displaced to be pushed upward with respect to the insertion direction of the key 10 against the force from the spring portion 3d.

[0041] Accompanying the displacement of the arm portion 3e, the lock plate 3 rotates to be displaced in a direction such that the engagement portion 3b moves away from the groove 20a against the force from the spring portion and the guide pin 3a moves away from the hole 20b (arrow B direction illustrated in Fig. 3).

Then, when the key 10 is inserted into the key hole 6a until the guide pin 3a is displaced to a position completely separated from both the hole 20b and the groove 20a, fixation of the upper portion of the electronic shelf label 1 is released. Further, due to the force from the spring portion 3d of the lock plate 3, the front end portion 10a of the key 10 is held by a certain degree of force between the arm portion 3e and an inner wall face of the key hole 6a, and thus force to take out to a front side can be applied to the electronic shelf label 1 using the key 10 as a handle.

[0042] Therefore, as illustrated in Fig. 6C, when force is applied to pull off the upper portion of the electronic shelf label 1 in arrow G direction in the view while grabbing a rear end portion 10b of the key 10, since fixation of the upper portion of the electronic shelf label 1 is released, the upper portion of the electronic shelf label 1 can be removed from inside the rail 20 in a manner of pulling out.

Thereafter, by removing the hooks 5a and 5b from the groove 20c of the rail 20, the electronic shelf label 1 can be removed completely from the rail 20. After the label is removed from the rail 20, the key 10 can be pulled out from the key hole 6a with a similar degree of force to insertion, although there is a slight resistance, by applying force in a direction reverse to that of insertion.

[0043] Note that when the rear end portion 10b of the key 10 is grabbed to pull out the upper portion of the electronic shelf label 1 from the rail 20, the force to be applied from the hand to the key 10 is mainly in a direction to push the key 10 against the inner side face of the key hole 6a or the arm portion 3e, and thus it is conceivable that pulling off of the key 10 from the key hole 6a by mistake rarely occurs. Further, the size of the key hole 6a and the force from the spring portion 3d are preferred to be set so that such a degree of holding force can be obtained.

[0044] In this manner, the electronic shelf label 1 can be removed from the rail 20 by a simple operation using the compact thin-type key, by inserting the key 10 into the key hole 6a, and pulling out the upper portion from the rail 20 in this inserted state as it is. Therefore, an operation of removal is quite simple, by which high operation efficiency can be achieved. Moreover, the key can be made of a light weight, and hence does not become a load when being carried by a worker.

[0045] Further, since no magnet or metal part is necessary to achieve this function, there is no concern of causing electromagnetic interference to an electronic circuit provided in the electronic shelf label 1 and communication interference in radio communication means.

Moreover, the structures of the lock plate 3, the key attaching portion 6, and so on necessary for the fixing and removing can be achieved with a small number of parts, and the electronic shelf label 1 can be produced at low cost.

[Second Embodiment: Fig. 7 and Fig. 8]

[0046] Next, a second embodiment of the electronic

shelf label of the invention will be described.

Regarding the electronic shelf label 1 of the first embodiment described above, the structural example is described in which fixation is released by pushing up the arm portion 3e of the lock plate to an upper side of the electronic shelf label 1 with respect to the insertion direction of the key. An electronic shelf label 31 of the second embodiment is such that fixation is released by pushing down the arm portion of the lock plate to a lower side of the electronic shelf label 1 with respect to the insertion direction of the key. Only the structures of the lock plate, the key attaching portion, and the housing rack and movement of the lock plate are different from those in the first embodiment. Thus, mainly these points will be described.

[0047] Fig. 7 is an external perspective view of a rear face side corresponding to Fig. 2 of the electronic shelf label 31 which is the second embodiment of the electronic shelf label of the invention. Fig. 8 is an explanatory view of the same corresponding to Fig. 3.

In the electronic shelf label 31, as illustrated in Fig. 7 and Fig. 8, a lock plate 33 is an integrally molded member which has an arm portion 33c having a guide pin 33a and an engagement portion 33b in an upper part, and has a spring portion 33d in a lower portion and an arm portion 33e on a side of one side face. By housing a portion thereof in a housing portion 34a of a housing rack 34, and inserting a front end portion of the arm portion 33e in a slit 36b of a key attaching portion 36, the lock plate 33 is held in a manner slidable in a vertical direction along a rear face of the electronic shelf label 31.

[0048] The spring portion 33d has a front end portion abutting on a bottom face inside a spring stopping portion 38 provided on the rear face of the electronic shelf label 31, and is an applying means serving to apply upward force to the entire lock plate 33. The spring portion 33d may be fixed to the bottom face inside the spring stopping portion 38.

Further, in a state where no external force acts on the lock plate 33, the lock plate 33 moves upward to a position where an upper face of the arm portion 33e inserted in the slit 36b abuts on an upper end of the slit 36b by the force from the spring portion 33d, and stops at a position which is preferable for engaging the guide pin 33a and the engagement portion 33b with a groove provided in a rail, as illustrated in Fig. 7.

[0049] The electronic shelf label 31 with such a structure can be fixed to the rail 20 by the guide pin 33a, the engagement portion 33b, and hooks 35a and 35b in a procedure similar to one described using Fig. 5 regarding the electronic shelf label 1 of the first embodiment.

Removal from the rail 20 is mostly similar to the removal described using Fig. 6 regarding the electronic shelf label 1 of the first embodiment.

[0050] However, in the case of the electronic shelf label 31, the key is inserted into the key hole 36a of the key attaching portion 36 with an inclined face of the front end portion 10a of the key 10 directed downward. Then, when the front end portion 10a is inserted gradually deeper into the key hole 36a, and the inclined face of the front end portion 10a abuts on the upper face of the arm portion 33e of the lock plate 33 arranged deep in the key hole 36a, a thrust load to push downward is applied to the arm portion 33e from the inclined face of the front end portion 10a as the key 10 is inserted. Then, by this thrust load, the arm portion 33e is displaced to be pushed downward (arrow H direction) with respect to the insertion direction of the key 10 against the force from the spring portion 33d. Accompanying this, the entire lock plate 33 is displaced in the arrow H direction, and the positions of the guide pin 33a and the engagement portion 33b can be moved to positions lower than an upper face of the main body of the electronic shelf label 31.

[0051] Then, when the key 10 is inserted into the key hole 36a until the guide pin 33a and the engagement portion 33b are both displaced to positions completely separated from the hole 20b and the groove 20a, fixation of the upper portion of the electronic shelf label 31 is released. In this state, similarly to the case of the first embodiment, when force is applied to pull off the upper portion of the electronic shelf label 31 while grabbing the rear end portion 10b of the key 10, the upper portion of the electronic shelf label 31 can be removed from inside the rail 20 in a manner of pulling out.

In this state, it is also similar to the first embodiment that, due to the force from the spring portion 33d of the lock plate 33, the front end portion 10a of the key 10 is held between the arm portion 33e and an inner wall face of the key hole 36a.

[0052] With the structure as described above, effects similar to those of the first embodiment can be obtained. Further, the structure of the lock plate can be more simplified than that of the first embodiment, and thus cost reduction can also be achieved. However, in the case of sliding on the main body of the electronic shelf label 31 as in this embodiment, smoothness in movement is slightly lower than the case of rotating about the shaft 7 as in the first embodiment. Therefore, the structure of the desired embodiment may be employed depending on which of cost and smoothness is regarded as more important.

[Modification Examples: Fig. 9 to Fig. 10E]

[0053] In addition, the following modifications are conceivable for the above-described embodiments.

First, it is conceivable to apply the force to the lock plate by a separate spring instead of the spring portion integrated with the lock plate.

[0054] Fig. 9 is a rear view of a structural example of the case where this modification is applied to the second embodiment.

In an electronic shelf label 31' of this modification example, instead of the spring portion 33d of the lock plate 33 in the electronic shelf label 31 of the second embodiment, as illustrated in Fig. 9, a separate spring 40 is provided

in a lower portion of the lock plate 33'. This spring can be structured as, for example, a helical spring.

[0055] The spring 40 has one end housed in a spring stopping portion 38 provided on a rear face of the electronic shelf label 31', and the other end fitted with a shaft 33g provided on a lower side of the lock plate 33', thereby making it less likely to be dropped from the electronic shelf label 31'. The both ends or one end may be fixed to the spring stopping portion 38 or the lock plate 33'.

[0056] Even when upward force is applied to the lock plate 33' by such a separate spring 40, attachment and removal of the electronic shelf label 31' to/from the rail 20 can be performed similarly to the case of the electronic shelf label 31 of the above-described second embodiment, and thus similar effects can be obtained.

Although illustration is omitted, similar modification can be made to the first embodiment. Moreover, it is also conceivable to give the force by an elastic member other than the spring.

[0057] Further, as another modification, instead of forming the key hole 6a in a simple slit shape, it is also conceivable to provide an obstacle such as a projection on an inner wall so that only a key having a shape corresponding to the shape of the obstacle can be inserted into the key hole.

Fig. 10A to Fig. 10E are front views illustrating structural examples of key hole of the electronic shelf label in this modification example. The structure of the key hole is in common between the electronic shelf label 1 of the first embodiment and the electronic shelf label 31 of the second embodiment, but here the numerals for the electronic shelf label 1 will be used for description.

[0058] As the structure of the key hole 6a, first, as illustrated in Fig. 10A to Fig. 10C, it is conceivable to provide plural rectangular projections 6c on inner walls of the key hole 6a. The projections 6c may be provided only at certain positions in a key inserting direction, such as only in the vicinity of an opening portion or only on a deep side, and/or may be provided to have a predetermined length in the key hole. Further, in this case, regarding the key to be inserted into the key hole, grooves or cutouts having a corresponding shape may be provided at positions corresponding to the projections in the key hole. The number of projections may be any number, or only one projection may be provided.

[0059] Further, regarding the shape of obstacles provided on the inner walls of the key hole, an arbitrary shape may be employed, including a triangle shape as illustrated in Fig. 10D or a semicircular shape as illustrated in Fig. 10E. The shape may be one completely blocking a part of the key hole.

By employing such a structure, the electronic shelf label cannot be removed from the rail 20 unless the specific key corresponding to the shape of the key hole is used, and thus the risk of unauthorized removal can be reduced more. Further, by meshing between the projections of the key hole and the grooves of the key, the key can be held with stronger force in the key hole than when the projections are not provided. Thus, when the electronic shelf label is removed from the rail 20 with the key being a handle, the risk of pulling off the key by mistake can be reduced.

[0060] Note that for the obstacles as described above, even ones that allow insertion of an arbitrary key to the middle will suffice as long as they do not allow a key that has no corresponding groove or cutout to be inserted into a degree that the lock plate is displaced sufficiently for removing the electronic shelf label.

Further, other than providing the obstacles, the shape of the key hole may be changed to a shape other than the flat plate shape, such as a curving shape or a bending shape, thereby allowing insertion of a key having a corresponding shape only. Further, it is also conceivable to employ a bar-shaped key and a key hole corresponding to the key. However, in relation with the space of the key hole, it is preferred to use a flat plate-shaped key and a key hole corresponding thereto.

[0061] As other modifications, the following ones are also conceivable.

First, regarding the insertion direction of the key, not only the structure in which the key is inserted from a front face into the electronic shelf label, but a structure in which the key is inserted from a different direction may be employed as long as it is a direction allowing insertion while the electronic shelf label is attached to the rail. For example, the key hole may be provided to allow insertion of the key from the longitudinal direction of the rail on the side of a side face of the electronic shelf label. Even when such a modification is made, operation similar to the case of the above-described embodiments is possible by adopting a structure in which, for example, the arm portion 3e of the lock plate 3 is bent in an appropriate direction and extended to a position where it abuts on the key.

[0062] Further, not only the structure in which the arm portion 3e abuts on the side face of the key, it is also conceivable to adopt a structure in which the arm portion abuts on the front end of the key and is displaced by a load applied in the insertion direction of the key in response to a pushing operation of the key, and by this displacement, the engagement portion is displaced in a direction to be removed from the groove 20a of the rail 20. Further, the arm portion 3e abutting on the key and the arm portion 3c having the guide pin 3a and the engagement portion 3b are not necessarily be an integrated part. There will be no problem as long as they are structured such that displacement of the arm portion 3e is transmitted to the arm portion 3c, and thereby the arm portion 3c can be displaced appropriately in response to displacement of the arm portion 3e.

[0063] Further, when the electronic shelf label 1 is fixed to the rail 20, if it is sufficient to fix the label in a manner movable in the rail longitudinal direction, the guide pin 3b may be omitted. When stoppers are provided on both ends in the longitudinal direction of the rail 20 so that the electronic shelf label 1 cannot be removed by sliding, such a structure can also achieve the effect of theft pre-

vention.
Further, having a hook shape like the hooks 5a and 5b, the second engagement portion has an advantage that rotating at the time of removing the electronic shelf label 1 can be performed easily. However, other than the hook shape, it is also conceivable to have a flat plate shape like the engagement portion 3b, and this part is fitted in the groove on the rail to thereby engage the part with the rail.
Further, the structures of the embodiments and modification examples which have been described may be combined and applied within a range in which no discrepancy occurs.

Industrial Applicability

[0064] An electronic shelf label according to the present invention is easily attachable to and removable from a product shelf, and is capable of preventing theft. Thus, usability of the electronic shelf label can be improved significantly.

Citation List

Patent Literature

[0065]

PTL1: Japanese unexamined patent publication No. 2001-178599
PTL2: Japanese unexamined patent publication No. 2001-312221
PTL3: United States Patent No. 6418651

Claims

1. An electronic shelf label displaying information related to a product by an electrically driven display panel, comprising:

as fixing means for detachably fixing the electronic shelf label to a rail provided on a product shelf,
a first and a second engagement portions for engaging with an engagement portion provided on a side face of the rail; and
an applying means for applying force to the first engagement portion in a direction toward the side face of the rail in a state of being fixed to the rail,
the electronic shelf label further comprising:
a key hole into which a thin plate-shaped key for releasing fixation of the electronic shelf label to the rail by the fixing means is inserted; and
an arm portion provided at a position abutting on the key inserted into the key hole, the arm portion being displaced by a load applied by the key in response to insertion of the key and, accompanying this displacement, displacing the first engagement portion in a direction to depart from the side face of the rail against the force applied by the applying means.

2. The electronic shelf label according to claim 1, wherein
the key hole is formed such that the key is inserted substantially perpendicularly to a bottom face of the rail and in a direction along a side face of the electronic shelf label perpendicular to a longitudinal direction of the rail.

3. The electronic shelf label according to claim 1, wherein
the key has a shape which becomes narrower toward a front end thereof at least within a range in which the key abuts on the arm portion when being inserted into the key hole,
the force applied by the applying means acts on the arm portion, and when the key is inserted into the key hole, the arm portion is displaced by the key in a manner to be pushed outward with respect to the insertion direction against the force as the key is inserted.

4. The electronic shelf label according to claim 3, wherein
in a state of being inserted into the key hole until the first engagement portion is displaced to a degree of being released from the engagement portion of the rail, the key is retained between the arm portion and a wall face of the key hole by the force applied by the applying means, and in this state, it is possible to remove the electronic shelf label from the rail using the key as a handle.

5. The electronic shelf label according to claim 3, wherein
the first engagement portion and the arm portion are an integrated member rotatably fixed to a rear face side of the electronic shelf label, and when the arm portion abuts on the key and is pushed outward, the member rotates to displace the first engagement portion in a direction to depart from the side face of the rail.

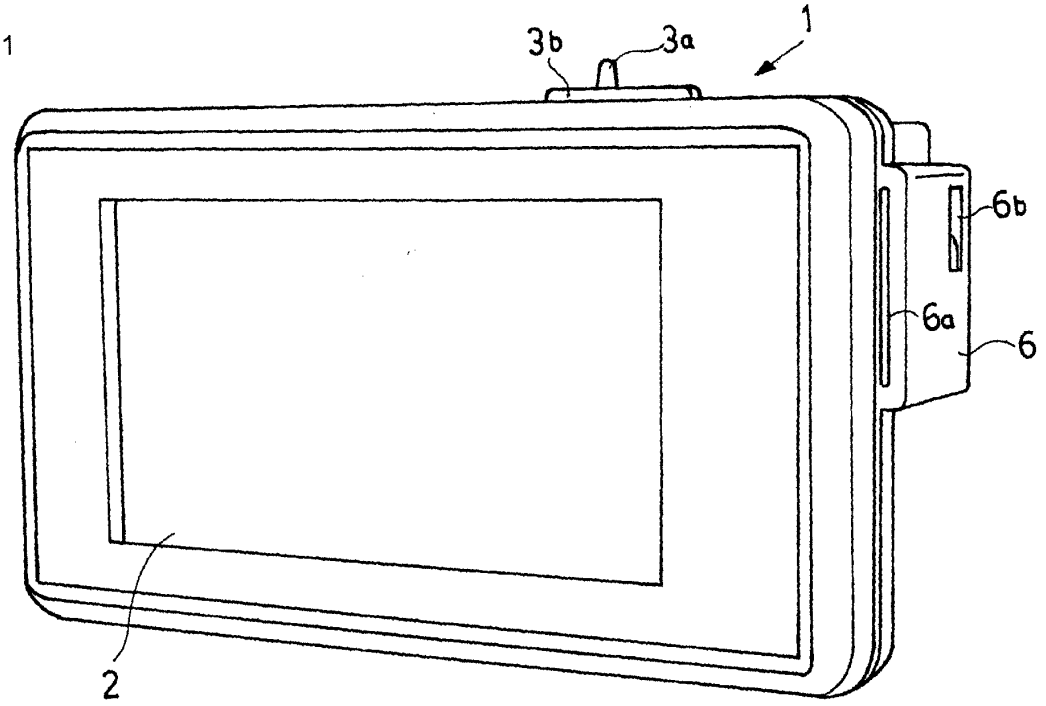
6. The electronic shelf label according to claim 3, wherein
the first engagement portion and the arm portion are an integrated member held on a rear face side of the electronic shelf label in a manner slidable along the rear face, and when the arm portion abuts on the key and is pushed outward, the member slides along the rear face of the electronic shelf label to displace the first engagement portion in a direction to depart from the side face of the rail.

7. The electronic shelf label according to claim 1, wherein
an obstacle is provided on an inner wall of the key hole, so that only a key having a groove or a cutout corresponding to the obstacle can be inserted into the key hole.

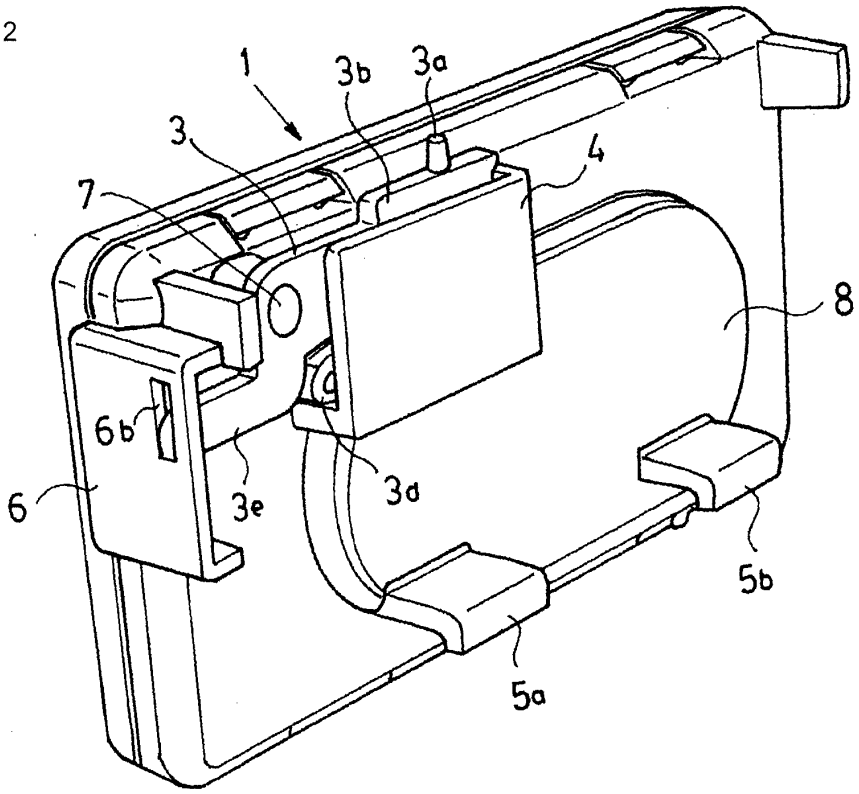
8. The electronic shelf label according to claim 1, wherein
the rail is provided, on the side face corresponding to the first engagement portion, with a groove which internally comprises a hole, as the engagement portion, and
the first engagement portion engages with the groove, and comprises a guide pin to be inserted into the hole in the groove.

9. The electronic shelf label according to claim 1, wherein
an exterior including the first and the second engagement portions, the arm portion, the applying means, and the key hole is formed of resin.

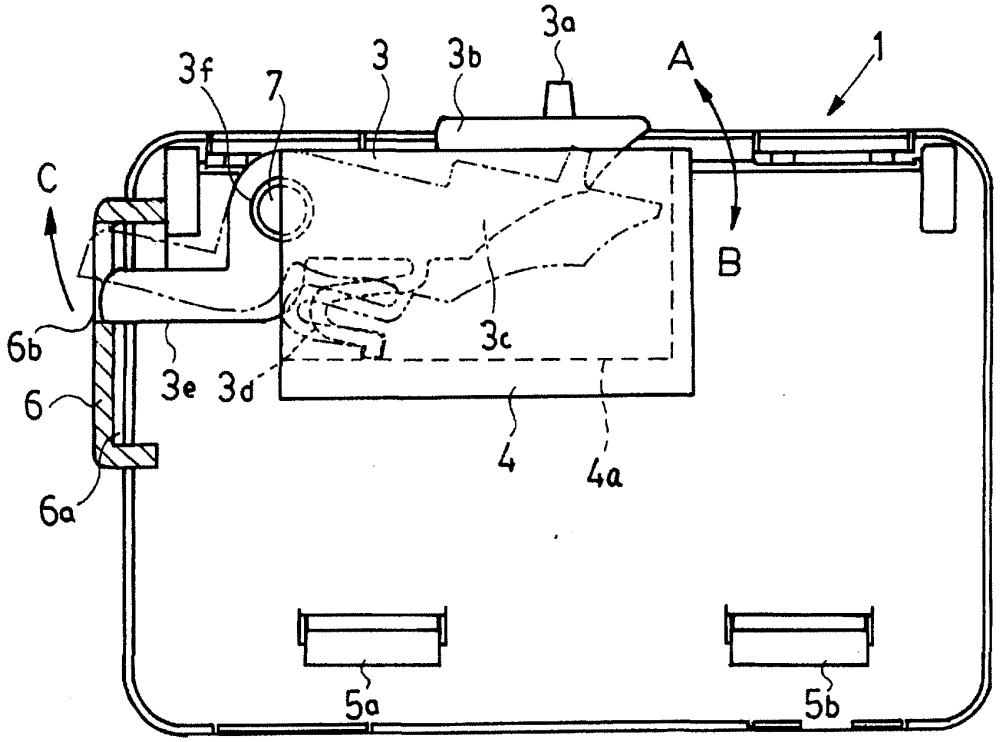
Figur 1



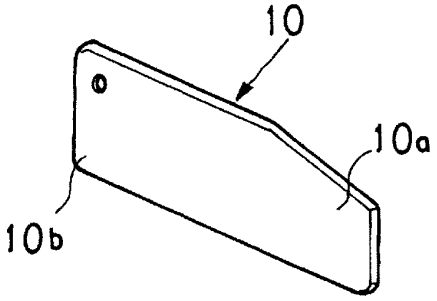
Figur 2



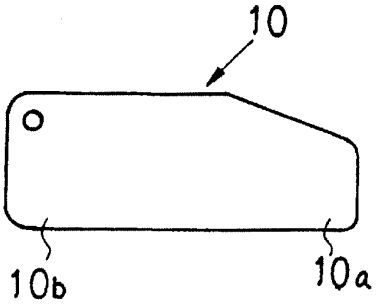
Figur 3



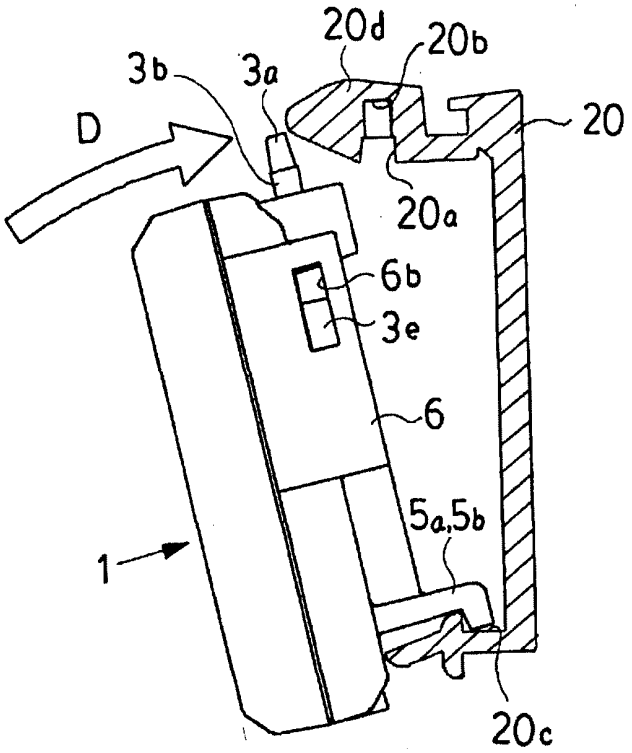
Figur 4A



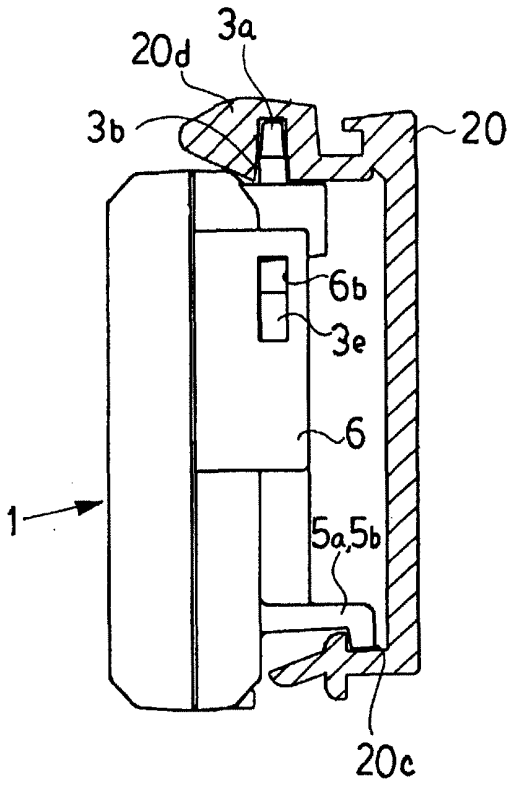
Figur 4B



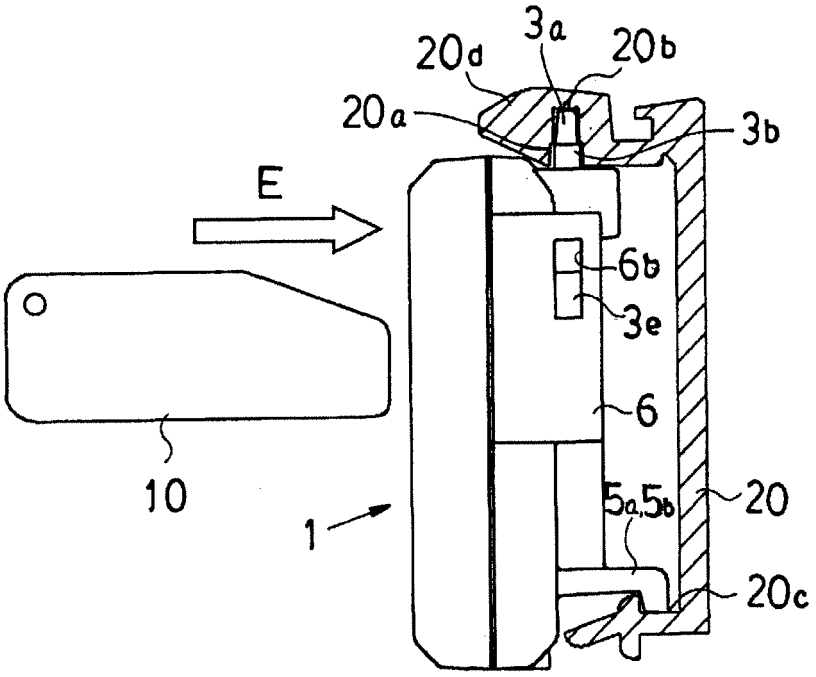
Figur 5A



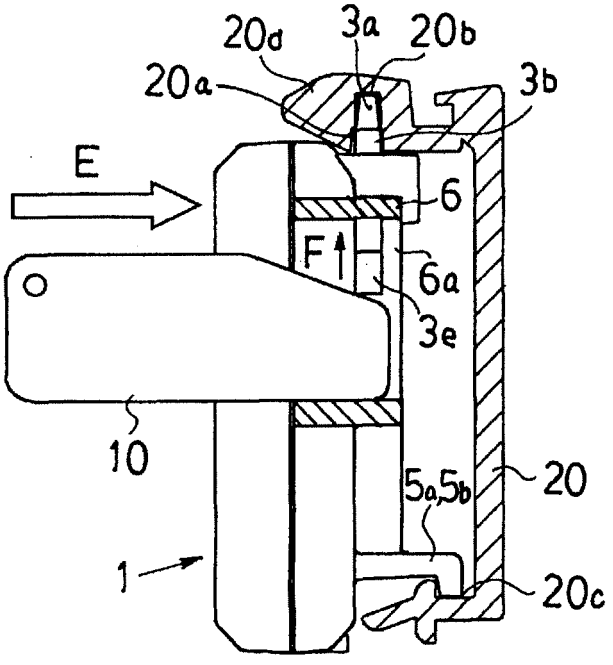
Figur 5B



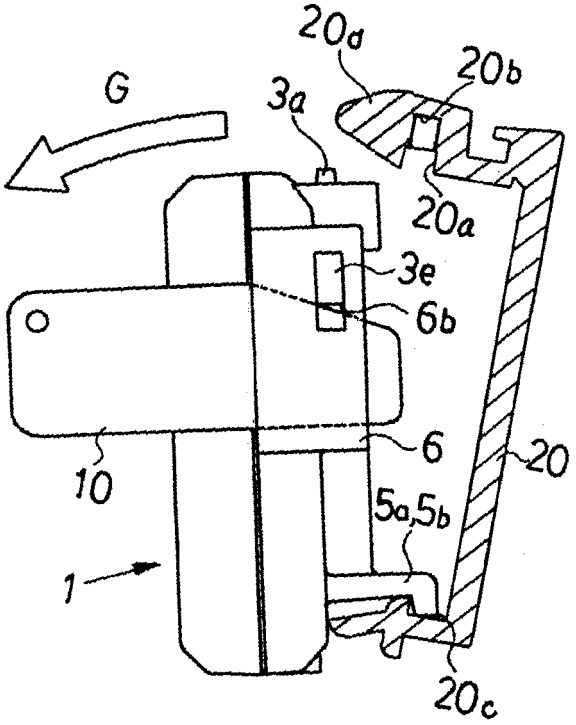
Figur 6A



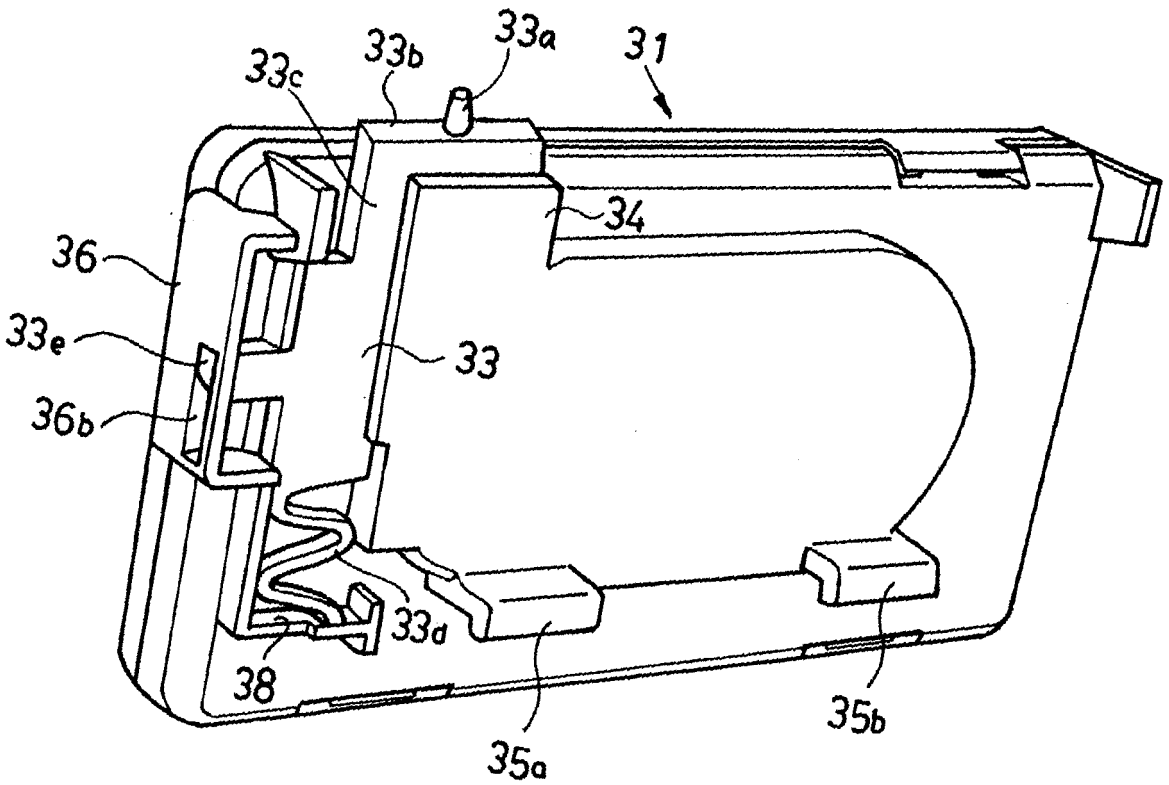
Figur 6B



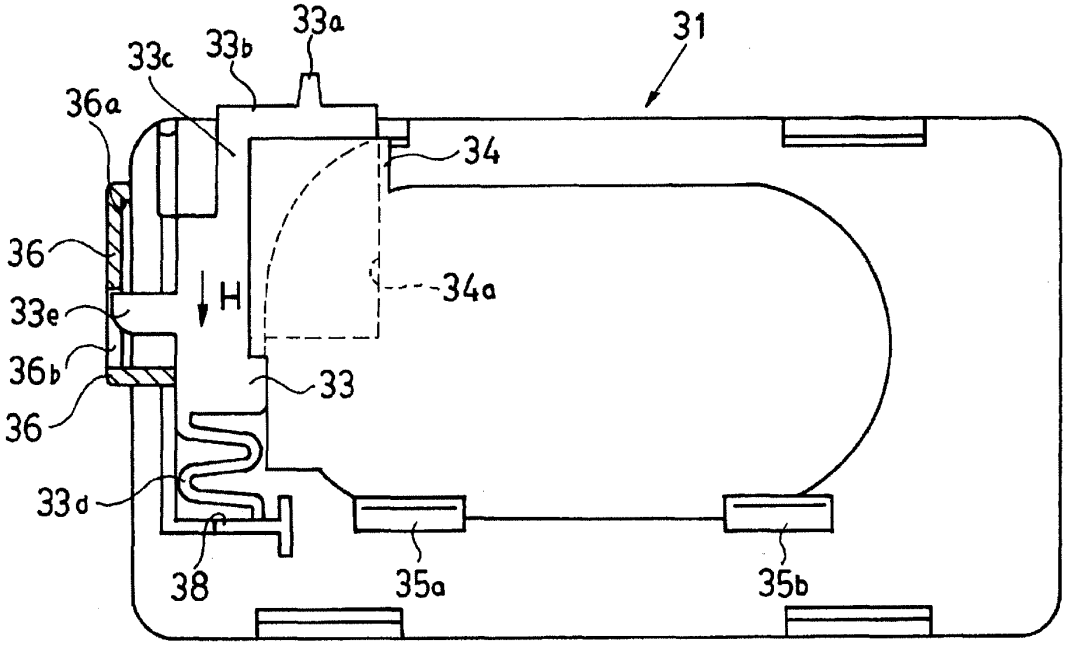
Figur 6C



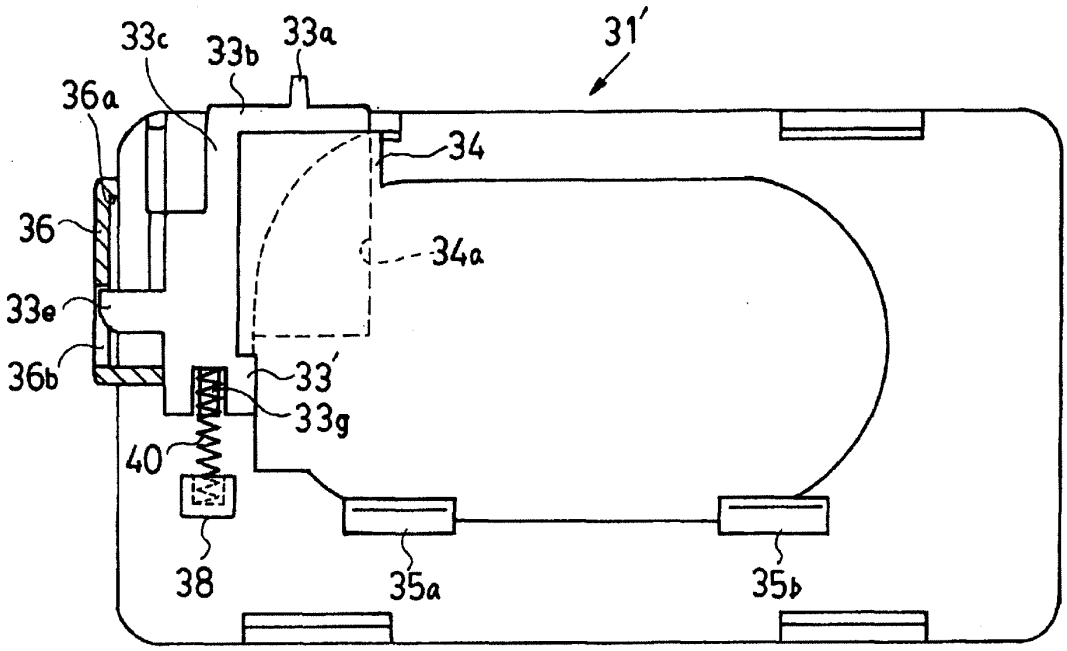
Figur 7



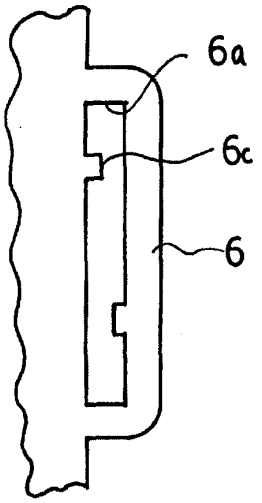
Figur 8



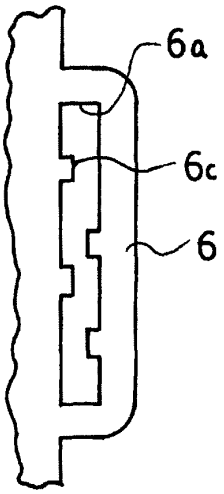
Figur 9



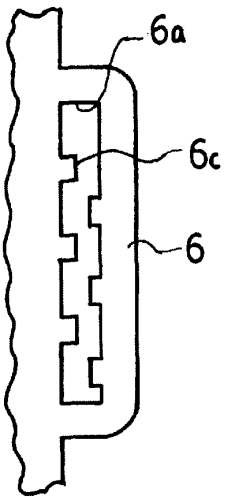
Figur 10A



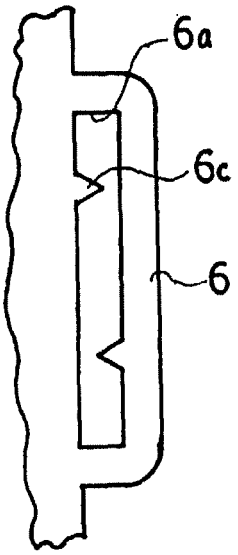
Figur 10B



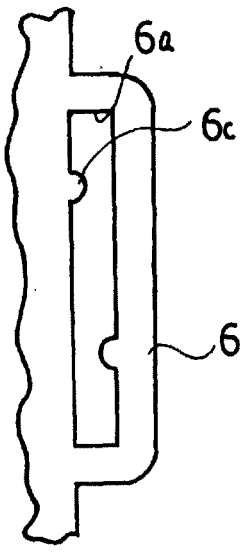
Figur 10C



Figur 10D



Figur 10E



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2009/058578

A. CLASSIFICATION OF SUBJECT MATTER
A47F5/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A47F5/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2009
Kokai Jitsuyo Shinan Koho	1971-2009	Toroku Jitsuyo Shinan Koho	1994-2009

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2003-233323 A (Nikken Industry Co., Ltd.), 22 August, 2003 (22.08.03), Par. Nos. [0027] to [0029]; Figs. 1 to 5 (Family: none)	1-3,5-9 4
Y A	JP 06-067613 A (Kabushiki Kaisha Ato Paneru Konsarutanto), 11 March, 1994 (11.03.94), Par. Nos. [0019] to [0038]; Figs. 1 to 7 (Family: none)	1-3,5-9 4

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01 July, 2009 (01.07.09)	14 July, 2009 (14.07.09)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2001178599 A **[0065]**
- JP 2001312221 A **[0065]**
- US 6418651 B **[0065]**