



- (51) International Patent Classification:  
*G09F 3/20* (2006.01)     *G06Q 30/02* (2012.01)
- (21) International Application Number:  
PCT/IB2017/050388
- (22) International Filing Date:  
25 January 2017 (25.01.2017)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
102016000009960 1 February 2016 (01.02.2016) IT
- (71) Applicant: C.A.O.S. SOLUTION S.R.L. [IT/IT]; Vicolo del Laghetto 19/4, 00040 Castel Gandolfo (RM) (IT).
- (72) Inventor: OSSINI, Giovanni; C/O C.A.O.S. SOLUTION S.R.L., Vicolo del Laghetto 19/4, 00040 Castel Gandolfo (RM) (IT).

- (74) Agents: FIAMMENGHI, Eva et al.; Via delle Quattro Fontane, 31, 00184 Roma (IT).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU,

[Continued on next page]

(54) Title: KIT OF ELECTRONIC INFORMATION SYSTEMS AND MEANS FOR THE SUPPORT THEREOF

(57) Abstract: Kit of electronic information systems to be used inside public commercial sites such as shopping malls, stores and the like, operating in the field of food distribution or otherwise, said kit being adapted to provide information regarding the products on sale that are exhibited on the shelving inside said commercial sites.

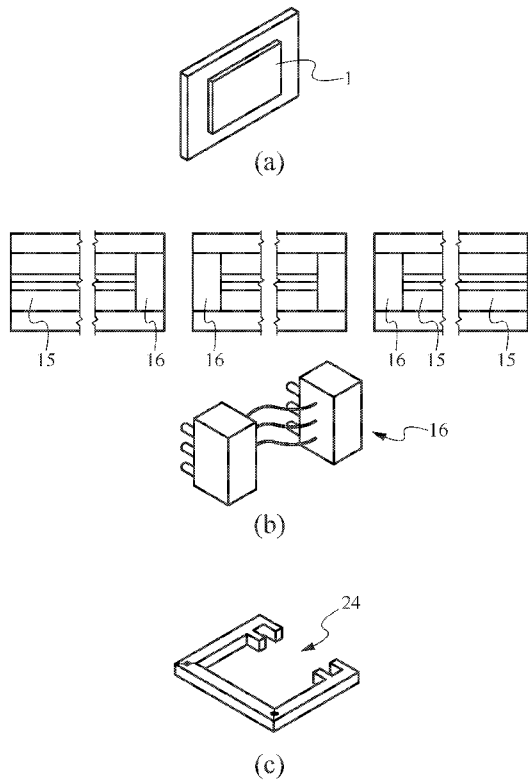


Fig. 1

WO 2017/134543 A1

TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

**Published:**

— *with international search report (Art. 21(3))*

“Kit of electronic information systems and means for the support thereof”

Description

5 Field of the art

The present invention refers to the field of electronics and mechanics. More in detail, the present invention refers to a kit comprising at least one electronic device adapted to indicate information. Still more in detail, the present invention regards a kit comprising a new type of electronic labels to be installed inside sites such as supermarkets, shopping malls, stores and  
10 the like, in order to provide users with indications regarding the various types of merchandize for sale. The present invention also refers to the means necessary for locking and unlocking said electronic labels onto the/from the guide bars adapted for the support thereof, and to said particular guide support bars which are specific for the type of electronic labels described herein.

15

State of the art

Various types of labels have been known by now for many years, above all inside points of sale set for the distribution of food products. Such labels are typically paper, and are placed at the commercial products displayed inside the structure; the labels are suitable for  
20 indicating information regarding the products with which they are associated. For example, various types of labels are widely known, usually in card format, detectable on the shelves supporting the merchandise in the lanes of supermarkets and showing the price or the particular commercial offers or promotions of the products for sale. Usually, in the latter case, i.e. when commercial offers are proposed to the public, the labels in question are all  
25 substantially characterized for their distinctive clear character, detectable in a particular profile, in a color that is nearly always striking/conspicuous, or in the information indicated therein consisting of a writing that is typically more visible to the public with respect to what is verifiable on the other labels, indicating the standard prices of the products for which no

promotions and the like are provided. All this in order to inform the public of the possibility to purchase specific products at lower prices, as well as to stimulate the purchase of such products.

Nevertheless, even if the function of such labels and the simplicity of their structure is undoubted, in more recent times there is agreement on the fact that the use of paper for  
5 indicating the aforesaid information involves considerable expense, *in primis* due to the frequency with which their substitution is required. Reasonably, the labels in question must be frequently changed in accordance with the variable product promotions and offers, involving frequent topographical expenses as well as those relative to the cost of the  
10 personnel employed for their affixing and substitution. Such critical issues were overcome by introducing, within the points of sale such as those listed above, a particular type of electronic labels that are “fixed”, with the purpose of leaving unchanged their position and hence their substitution, and limiting the operations associated with the variation of information. Such conditions can be obtained by changing, in an automated manner, the  
15 message indicated by the label which is for such purpose provided with a suitable electronic display. The labels thus conceived require, for the operation thereof, electrical power supply which is conventionally provided due to common lithium batteries provided for each label. Even if the use of such electronic labels has allowed attaining an effective and timely alignment of the prices shown by the labels exhibited on the shelf with those of the check-  
20 out counter, hence avoiding having to recur to topographic operations, the poor light of the display has however not allowed rendering the information contained therein visible to the public, thus hindering one of the main objects of the labels: that of attracting the public towards the label, informing it of the promotion underway for a particular product type, and stimulating the public towards the purchase of such products. It is therefore intuitable that  
25 labels lacking the visibility requirement do not fulfill their main function! Indeed, testing on electronic label diffusion within supermarkets has illustrated the confusion of the public and a clear loss of earnings from the promotions. There was therefore a considerable return to the use of paper cards, and a lack of the hoped-for savings regarding the costs relative to the

topographic and management personnel expenses. In addition, the cards or electronic labels known up to now are, as stated above, conventionally power supplied with lithium batteries, lithium well-known to be a harmful element for which a specific and sophisticated disposal path is provided for; yet the rigorous actuation of such path might not always be ensured. All  
5 this more greatly augments the risk of increasing the quantity of polluting, hard-to-dispose-of material, which is already considerable in the environment.

For such purpose, the object of the present invention, described in detail hereinbelow, is that of proposing a kit comprising a new type of electronic labels, for the abovementioned uses, which in addition to accomplishing the functions (with increased effectiveness) for which the  
10 electronic labels were originally designed, also annuls the risk of incurring the problem of disposal of the lithium batteries. More in detail, the electronic labels of the present kit have structural characteristics which increase the possibility of attracting the attention of the clientele, not just towards the products on sale but also towards those food products that are close to expiry and hence advantageously promoted. It is therefore important to underline  
15 that the problem of food waste has become one of the most pressing current issues, such to perhaps require a government legal measure. Beyond their role in attracting clients towards the products approaching expiry date, the labels of the present kit comprise structural characteristics that consistently limit the strong environmental risk due to the large quantity of lithium batteries conventionally employed for the power supply of the electronic labels  
20 known up to now.

In order to improve the comprehension of the present invention, it should be indicated that the conventional and known electronic labels provided with lithium batteries make use of a system of distributed electrical power supply which provides that each electronic label is autonomous, provided with display, controller, battery and radio module necessary for  
25 communication with a centralized device from which the value of the prices to be displayed is received. This known system is such that the single labels are therefore autonomous and, by means of a radio receiver, are configured by the gate way of the point of sales. In addition, these known electronic labels are structured for being housed in suitable plastic

card-holder bars, whose function is substantially that of mechanical support.

The present industrial invention patent application intends to describe and claim, in addition to the aforesaid particular type of electronic labels, also the means necessary for the support and for the locking/unlocking of said electronic labels. More in detail, the object of the following description also includes the components such to ensure electrical continuity between the electronic label/labels and the remote electrical power supply system and to prevent such labels from being furtively removed by non-authorized personnel. As stated above, the support bars adapted to support labels power supplied with simple batteries accomplish only a mechanical support role. However, the guide bars obtainable with the present kit in particular allow ensuring electrical continuity with the power supply lines and allow suitably supporting the labels. All this in order to contribute to the achievement of an information system, comprising electronic labels, to be installed on the shelves of the sales point, which makes use of a centralized power supply system, no longer distributed, thus *in primis* preventing the required use of harmful, hard-to-dispose-of lithium batteries.

The present industrial invention patent application also intends to describe a further component comprised in the present kit and in particular a “handle”-like device which allows only the operator to install and/or remove and substitute the electronic labels, since only the operator is provided with such device for locking/unlocking the electronic labels.

Among the characteristics that can be encountered in the electronic labels of the present kit, there is in fact a particular reversible locking system adapted to allow stably but reversibly fixing the label in its position and simultaneously preventing the label from being furtively removed by non-authorized personnel. The object of the present industrial invention patent application is therefore also that of proposing a device adapted to lock/unlock these particular electronic labels comprised in the kit of electronic information systems.

25

#### Description of the invention

The present description refers to a new kit of electronic information systems comprising a new type of electronic labels adapted to be installed at public sites, such as commercial

structures and in particular commercial structures that operate in the field of food distribution, or otherwise. Typically, these are supermarkets and the like. The present description also regards the components necessary for the support of said labels and the components necessary for locking/unlocking said labels.

- 5 For the purpose of an improved comprehension of the following description, the components of the present kit will be described separately in sequence herein, by analyzing: first the electronic label, then the components necessary for the support of said electronic label and finally the means necessary for the locking/unlocking of said labels.

The electronic labels of the present kit are, as anticipated, adapted to indicate the information  
10 regarding the product for sale, in particular that regarding the price corresponding to a standard price condition or to an offer/promotion and the like, with the intention of more effectively informing the public of the information associated with that particular type of product. Unlike the known electronic labels, the electronic label of the kit, object of the present industrial invention patent application, is characterized in that it has structural  
15 characteristics that render it advantageously higher-performing in terms of effectiveness in indicating information with respect to the known labels, given that it is provided with suitable optical signaling devices.

Advantageously said label involves a substantial contribution to decreasing pollution with respect to the conventional labels comprising hard-to-dispose-of lithium batteries, given that  
20 it lacks such battery type and is power-suppliable with a centralized electrical power supply system, hence with a common wired electrical grid.

Advantageously said label also results hard to remove from its position by non-authorized personnel, given that it is provided with a particular reversible locking system for the installation thereof on the support bar, which advantageously makes it not subject to theft or  
25 similar operations.

Advantageously said electronic label is also provided with a particular structural electrical arrangement that allows it to communicate in a bidirectional manner with a central master, thus allowing increased precision of the system effectiveness in the correct transmission of

the data to be indicated.

As already mentioned, the label of the kit, object of the present description, represents a particular component of a more extensive system, adapted to inform the single labels present within the commercial structure at the various products displayed to the public with regard to  
5 the type of information that must appear on each single display provided for each label.

More in detail, the electronic label of the kit according to the present invention comprises: at least one display, at least one controller, at least one suitable electrical/optical interface for the connection to the power supply and communication lines and at least one suitable and opportune electrical connector, with multiple poles, which ensures the contact between the  
10 label and the label-holder power supply bar. The aforesaid system adapted to inform the single labels appears as a structural arrangement in which the single labels are reversibly fixed to the suitable electrified guide bars, from which they are power-supplied. The label-holder guide bars can in turn be connected in series to each other, forming a chain grouping together a high number of electronic labels. In addition to the power supply lines, a third line  
15 is present, common to all the labels, by means of which the same manage the bidirectional data communication with the “master” thereof, from which they electrically and functionally depend.

At the head of each sequence of bars, a device can in fact be found – indicated herein as “master” – which has the function of power supply, given that it is set for power supplying  
20 all the electronic labels and the bidirectional communication interface, in order to drive the data line pertaining to the same electronic labels. The master set to give electrical power supply to all the labels can in turn be power supplied by 230Vac electrical mains, by a direct current electrical energy source or, as maximum expression of energetic/environmental sustainability, by suitable and specialized photovoltaic systems that make use of the artificial  
25 light inside the point of sales.

The description of the aforesaid information system has been briefly indicated only for making the present invention more comprehensible, not just in structural terms but also functional terms in a more extensive structural arrangement.



The label of the present kit comprises a commercial display which can be of standard LCD type or latest-generation e-paper type standard which, as main characteristic, preserves and makes visible the information even in the absence of power supply. Therefore, such display type synergistically contributes to the reduction of consumption. The controller present in

5 said labels instead carries out the double role of: managing the display and managing the bidirectional communication with the master. Said controller also performs diagnostic functions, monitoring the power supply voltage, the consumption, the electrical levels of the data, the good state of the contacts and the ambient temperature. Of particular importance for the attainment of the pre-established objects are the electrical/optical and mechanical

10 interface of the present label. More in detail, it is important that there is electrical continuity between the tips of the electrical contacts with which the label is provided and the small power supply bars resident on the label-holder bar. In the various embodiments, described in detail hereinbelow, the constant electrical connection with the guide bar is ensured, in one embodiment, by the elasticity of the metal/alloy used for the electrical contact which, due to

15 the deformation thereof, ensures the correct pressure thereof, while in another embodiment a thrust spring is instead provided which would allow using a less difficult metal for the obtainment of the electrical contacts. It should be indicated that in all the embodiments, the power supply voltages and electric currents have low value, so that there could be the onset of a slight electrical insulation between the electrical contacts, with a consequent increase of

20 the electrical contact resistance, greater voltage drop and final decay of the power supply voltage. The existence of such conditions – if verified – is canceled herein due to the use of an expedient commonly known as wetting which consists of breaking the insulation by applying a high-value electric voltage between the electrical contacts and by flowing an instantaneous high current, thus cleaning the contact zone. Hence, when the controller

25 detects an irregular decay of the power supply voltage, it notifies its master (there is at least one master for each sequence of labels) of such irregularity. Based on such signaling, the master communicates to all the electronic labels to be positioned in stand-by condition, and to the single electronic label that has signaled the irregularity, it will communicate the

activation of the circuits for the wetting of the contacts. Following this action, the master will inject, on the power supply and data bars, a high-voltage electrical pulse, necessary for the perforation of the insulating barrier.

If the malfunction could not be signaled, due to complete shut-down of the electronic label, in this condition the master will employ an alternative procedure which, due to a high-voltage but calibrated pulse, will not require the cooperation of the affected label.

As already mentioned, one of the advantages offered by the present invention is given by the fact that the electronic label of the present kit has structural characteristics such to render it safe against possible theft. Indeed, said label is also characterized by a particular reversible locking system which makes it hard to remove, if not with a specific tool, from its position on the guide bar. More in detail, the present label is provided in the lower part of its structure with a small piston with wide head, nail-like, which – through a hole made on the base of the body of the label – comes to be inserted in a corresponding anchorage hole verifiable on the lower side of the label-holder guide bar. The vertical movement of the small piston occurs due to an enclosing spring that has two spatial configurations: a first configuration in which said spring is at rest and the small piston is retracted, so as to allow the movement as well as the removal of the electronic label, and a second configuration in which said spring is compressed and the small piston, enclosed by said spring, is inserted in the aforesaid holes in a manner so as to make the movement of the label impossible. The passage from the removability condition to that of locking occurs due to the horizontal movement, in the transverse plane of the label, of a suitable movement bar which on the lower part has a projection adapted to press on the head of the small piston and to compress the spring which encloses it, with the result of inserting said small piston within mating holes and to lock the label. Otherwise, by moving said projection away from the head of the small piston, the latter will be brought back into its retracted condition corresponding with the rest configuration of the spring. The movement of the small piston, and more in detail that of the transverse bar, can occur with various methods that will be described more clearly in the following description of the preferred embodiments.

Further characteristic of the electronic label of the present kit is represented by the presence of an optical signaling system comprising LEDs on the sides of the label adapted to indicate, based on the on and off state or based on the color emitted or based on the intermittence of light emission, specific information that defines the price of a specific product type.

5 One of the particular features of centralized power supply is in fact that of being able to make use of a suitable source of electrical energy, such to allow the implementation of optical signals which, in distributed power supply, i.e. with lithium batteries, integrated in the electronic labels, would not be possible, due to the extremely limited energy capacity of the same batteries.

10 The HW (hardware) architecture and the FW (firmware) structure ideated and elaborated for such application allow modulating the light beam in terms of color, light intensity and diffusion angle. Such flexibility is essential for adapting the light beams to the different ambient brightness characteristics of the premises. In order to avoid annoying blinding, it is important that light beams are emitted with low intensity in the poorly-illuminated shadow  
15 zones; on the contrary, in the strongly-illuminated areas, it is instead necessary to emit light beams with greater intensity, so that they are rendered clearly visible. In addition, the centralized management of all the labels, by the Master, would offer another particular feature: that of synchronizing the light signals between all the labels resting in the same lanes, thus preventing bothersome flashing, unrelated with each other and only  
20 generating confusion among the public.

The electronic label of the kit, object of the present description, therefore represents an intelligent component comprising systems which synergistically cooperate within said label and with the other components of the information system to which they belong.

The present kit also comprises a plurality of modular structures and a plurality of connectors  
25 adapted to join said modular structures which, when connected, give rise to one or more electrifiable guide bars adapted to support and power supply said electronic labels. These are electrifiable support systems for the support and wiring of said electronic labels, which result power-suppliable with conventional wired electrical grids. The electrifiable guide bars thus

obtained are typically but not exclusively in turn connected to the borders of the shelves that receive the various types of products, regarding which the label supported by the guide bar shows specific and relative information.

More specifically said kit comprises modular structures, simply indicated hereinbelow as “modules”, in which each module comprises small electrical bars which, when connected with the tips of the electrical contacts provided for each label, ensure the power supply continuity for said electronic labels. Each module appears as a structure of suitable rigidity (such to ensure the support of the correlated electronic labels) having a longitudinal section shaped like a [, hence shaped like a bracket or a C or having similar profiles. More in detail, by laterally observing each module, it is possible to detect the aforesaid profile analogous to that of the longitudinal section of said module when it is spatially configured to be arranged for its installation on the edges of the shelving receiving the products. Each module more specifically comprises a lower flat portion, an upper flat portion and a central flat portion orthogonal to said lower flat portion and upper flat portion. Said three portions represent a continuum. In addition, as will be clearer from the following description of the preferred embodiments as well as from the observation of the enclosed figures, both the lower flat portion and the upper flat portion have structural characteristics such to ensure the support and stable and reversible fixing of the supported electronic label, while the central portion, orthogonal to the other two portions, comprises the components necessary for contributing to the electrical power supply and data transport continuity for said supported electronic label. As already mentioned, the kit, object of the present description, comprises, in addition to the aforesaid modules, also a plurality of connectors adapted for connecting said modules; the electrical continuity is always maintained in the structure resulting from the joining of said modules, hence in the guide bar, and consequently with the electronic labels supported thereby.

Advantageously the electrifiable support systems, hence the modules of the kit, object of the present invention, being specific for electronic labels power-suppliable by means of a common electrical grid, prevent having to use batteries, typically lithium batteries, limiting

the contribution to environmental pollution deriving from the use of such batteries.

Advantageously said modules, allowing the electrical power supply of said electronic labels without having to use batteries, allow reducing both the costs relative to the supply of such batteries and those relative to the disposal thereof.

5 Advantageously said modules, having structural characteristics which ensure the non-removability of the label by non-authorized personnel, have also shown to be an effective anti-theft system for the same labels, useful for preventing vandalistic or playful actions which, if involving the movement of the label from the position assigned thereto, could bring trouble/inconvenience both to the personnel of the store and the clientele.

10 Advantageously the modules of the present kit, comprising components that are relatively simple structurally, allow their industrial manufacturing at relatively low costs, involving market prices that are commercially convenient and stimulating the use of the kit and the obtainment of a more extensive information system with centralized rather than distributed power supply, with the above-listed advantages.

15 The present description also refers to a specific handle-like device for the locking/unlocking of said particular electronic labels on/from the support guide bar, on which said electronic labels are placed. More in detail, the handle-like device of the kit according to the present invention is a tool which allows fixing and removing said specific type of electronic labels provided in their structure with said particular system which allows the locking/unlocking  
20 thereof on/from the guide bars that support them. The components present in such type of electronic labels are functionally complementary to those of the handle-like device adapted for fixing/unlocking of the label and vice versa. Both structures, intending the label and the device of the present kit, comprise magnetic elements which by exerting their magnetic properties actuate further components responsible for the actual locking/unlocking of the  
25 label.

As already anticipated in the course of the present description, said particular electronic labels have, in the lower portion of their structure (with basically box-like profile), a transverse channel that horizontally traverses said lower portion of the label. Such channel is

adapted to receive a specific transverse bar having, on the lower part, a projection adapted to press the head of a small piston, nail-shaped, it too present in the lower portion of the label, and more specifically in a suitable housing situated in the portion below said transverse channel. Still more specifically said small piston has its head in the lower portion of said channel. This spatial configuration of the described components is such to ensure that the horizontal movement of the transverse bar in the channel can cause the contact of the lower projection of the bar with the head of the small piston, inducing the downward longitudinal movement thereof. Said small piston is also enclosed (as stated above) inside its housing by a spring that is compressed and relaxed following said vertical movement. In particular said spring is compressed when the projection of the transverse bar contacts the small piston and is relaxed when said projection moves away therefrom. At these two configurations of the spring, there is respectively the locking and the unlocking of the label. On the lower surface of the label and at said small piston, a hole is in fact present corresponding to another (blind) hole present on the support guide bar for the labels: the insertion of the small piston inside two mating holes causes the locking of the label; on the other hand, the extraction causes the unlocking thereof. The vertical movement of the small piston, induced by the contact and by the moving away of the projection present on the transverse bar with and from the head of said small piston, is induced upstream by the horizontal movement of the transverse bar in the channel comprised in the body of the lower portion of the label. Said channel is also accessible from a perforation present on at least one of the lateral surfaces of the label. Given that said transverse bar is inside the body of the label, its movement occurs by operating on the magnetic behavior shown by a permanent magnet fit on the end of the transverse bar at the inlet perforation into said transverse channel. More clearly, the movement of the bar occurs by making said fit permanent magnet interact with a further permanent magnet outside the label. Such external magnet is, more specifically, present on the handle-like device of the kit, object of the present invention. Hence, the movement of the transverse bar, and thus the locking/unlocking of the label, occurs by suitably fitting a pole of the magnet of the handle-like device with the pole of the permanent magnet fit on one end of the transverse

bar. Said end of the transverse bar is, in particular, that close to the perforation present on at least one of the lateral surfaces of the label. Such perforation makes possible the access to the channel, hence to the transverse bar, and in particular to its magnetic end.

More in detail, the handle-like device of the present kit preferably appears as a rigid and  
5 three-dimensional handle, comprising at least one arm, shaped like an L or [ or C or horseshoe or similar profiles. In any case, the handle-like device, independent of which of the aforesaid profiles it has, is characterized in that it has in at least one arm, and in particular in the end of at least one arm, at least one permanent magnet orientable in a manner such that its fitting with the permanent magnet fit on the bar causes an attractive or  
10 repulsive interaction in accordance with the spatial configuration of the handle-like device in proximity to the electronic label of the kit. More clearly, by approaching the permanent magnet of the bar, the end of the arm of the handle-like device having the magnet orientated such that the poles of equal sign are interfaced (one pole present on the handle-like device, the other on the end of the magnet fit on the bar) will have a repulsive interaction between  
15 the magnets. Such repulsive interaction will cause the horizontal movement of the transverse bar in the body of the label. More in detail, said movement ensures that the aforesaid projection of the transverse bar contacts the head of the small piston. In such a manner, the locking of the label is induced in the guide bar. Otherwise, by approaching the permanent magnet fit on the transverse bar, the end of the arm with the magnet oriented such that the  
20 poles of opposite sign are interfaced will have an attractive interaction between the magnets, with consequent horizontal movement of the transverse bar in the direction of its extraction from the body of the label. Such attractive action causes the relaxation of said spring, the lifting of the small piston and the unlocking of the label from the guide bar.

The identification of the “repulsive” end and the “attractive” end occurs due to a simple  
25 chromatic indication verifiable at the ends of the handle-like device. More in detail, in some embodiments, said handle-like device has one end whose red color indicates that such end, when moved close to the magnetic end of the transverse bar, will cause the locking of the electronic label, and one end whose green color indicates that by moving such end close to

the permanent magnet fit on the transverse bar, it will carry out an attractive force that will cause the movement of the bar in the direction of extraction from the body of the label and the consequent unlocking of said label from the support guide bar.

Advantageously, the handle-like device of the kit, object of the present description,  
5 comprising materials that are easy to find and being relatively simple structurally, allows its industrial manufacturing with relatively low costs.

Advantageously, given that said handle-like device is specific for the particular type of above-described electronic labels, the removal and locking of said labels only occurs by making use of such device, which therefore has also shown to be an effective anti-theft  
10 system.

#### Detailed description of the invention

The invention will now be described in detail hereinbelow in its preferred embodiments, with reference to the enclosed figures in which:

15

FIGURE 1 shows a representative view of the components of the kit of information systems, object of the present industrial invention patent application. The figure in question shows that said kit comprises at least one electronic label 1; a plurality of modules 15 and a plurality of connectors 16 adapted to allow the assembly of said modules 15 for the  
20 obtainment of at least one guide bar 200 (not shown in the figure in question) adapted to allow supporting said electronic label/labels 1; and at least one handle-like device 24 adapted to lock/unlock said electronic label/labels 1 to/from said guide bar 200.

FIGURE 2 shows a schematic view of the electronic label 1 of the present kit of information  
25 systems. More in detail, the figure in question shows that said electronics 1 comprises: at least one support structure 2 like a printed circuit, at least one display 3, adapted to show indications relative to the type of products in proximity to which said electronic label 1 is placed, at least one controller 4 adapted for managing said display 3, for managing the



bidirectional communication with a power supply master 100 and data manager (not shown in the figure in question), and for the diagnostics of the power supply voltage, of consumption, of the electrical levels of the data and of the effectiveness of the contacts and monitoring of the ambient temperature; and at least one electronic/optical interface 5 for the  
5 connection to the electrical power supply lines, for communication (between labels and master 100 and labels and operator terminal) and in particular for communication towards an optical terminal provided for the personnel of the point of sale. More in detail, as can be observed in the figure, said electronic/optical interface 5 comprises at least two power supply lines 5' and 5'' and at least one third line 5''' adapted to allow the bidirectional  
10 communication with a power supply master 100 and data manager with suitable optical components for an infrared optical communication, comparable to that of television controls.

FIGURE 3 shows a schematic view of the information system to which the electronic label belongs. More in detail the figure in question shows that said information system comprises  
15 a plurality of power supply masters 100 in which each master 100 is set for power supply and selective distribution of the data towards said electronic labels 1. More in detail, an upstream power supply master 100 is associated with each series of electronic labels affixed on a specific electrified guide bar 200.

20 FIGURE 4 shows a perspective view of the electronic label 1. More in detail, the figure in question, in addition to showing that the display 3 is provided with a suitable protective screen 3' made of optically transparent material, intends to show the presence of the tips of the electrical contacts 6 of the electrical connector with which said electronic label is provided. The presence of said electrical connector is essential for there to be connection  
25 continuity between the electronic labels 1 and the guide bars 200 (not shown in the figure in question). The connection continuity can be ensured also due to the elasticity of the metal/alloy with which said tips of the electrical contacts 6, as well as the entire connector, are made.

FIGURE 5 shows a side view of the electronic label 1. In said figure, the following can be observed: the support structure 2, the display 3 and a thrust spring 6' adapted to ensure the electrical continuity between the tips of the electrical contacts 6 and corresponding small electrical bars present on the guide bar 200 on which the electronic labels 1 are reversibly fixed. The presence of the thrust spring 6' is useful when the material constituting the tips of the electrical contacts 6 is not sufficiently elastic to ensure the continuity over time of the electrical connection between the electronic label 1 and the electrified guide bar 200.

FIGURE 6 shows a schematic view of the electric circuit adapted for connecting the electronic label 1 with the electrified guide bar. More in detail, the contacts C+ and C- refer to the tips of the electrical contacts 6 of the electrical connector comprised in the electronic label 1. References P+ and P- indicate the small power supply bars that slide on the bottom of the label-holder guide bar 200.

15

FIGURE 7 shows a front and schematic view of one of the components characterizing of the electronic label 1. More in detail, the figure in question shows that the electronic label 1 is provided with a particular system for its reversible locking on a specific electrified guide bar 200 (not shown). More specifically, said reversible locking system, in addition to allowing the stable and reversible fixing of the label on a predefined station, has also shown to be an effective anti-theft system. Such reversible locking system is represented by the presence, in the lower portion 10 of the electronic label 1, of a small nail-like piston 7 with the head lying in the lower portion of a transverse channel 8 present in the body of the electronic label 1 above said lower portion 10. As is observed from the figure, the small piston 7 is enclosed by a spring 9 for which there are two spatial configurations: the rest configuration, in which the small piston 7 is retracted and the label is removable, and the other configuration in which said spring 9 is compressed and the small piston 7 is inserted into two mating holes present as follows: one on the bottom of the label, the other on the electrified guide bar 200 (both

25

holes are not shown in the figure in question). The movement of the small piston 7 occurs due to the horizontal movement of a suitable transverse bar 11 present in said channel 8. Said transverse bar 11 is provided, on the lower part, with a projection 11' that by contacting the head 7' of the small piston 7 is able to induce the movement thereof in longitudinal sense, with consequent compression of the spring 9 and locking of the electronic label 1 in its position. The access of the transverse bar 11 to the channel 8 occurs due to an inlet/outlet perforation 8' and/or 8'' present on at least one side of the electronic label 1.

FIGURE 8 shows a perspective view of the electronic label 1 in which the presence of a groove 13 is underlined that is verifiable on the lower surface of the lower portion 10, adapted to allow the adaptation of the electronic label 1 with a corresponding projecting border present on the electrified guide bar 200 (not shown) on which said electronic label 1 is affixed.

FIGURE 9 shows a particular embodiment of the electronic label 1 in which, on the transverse bar 11 comprised therein, a permanent magnet 12 is fit on one end that is adapted to allow the horizontal movement of the transverse bar 11 in the channel 8 due to the interaction of said fit magnet 12 with another magnet, of opportune polarity and present on a specific tool (and in particular on the handle-like device not shown in the figure in question) adapted for the movement of said transverse bar 11. The repulsion between the magnets will cause the movement of the bar 11 towards the interior of the channel 8 in a manner so as to induce the contact between the projection 11' and the nail-like head 7' of the small piston 7 and the consequent locking of the electronic label 1; vice versa, the attraction of the magnets will cause the extraction of the bar 11 from the channel 8 and the consequent unlocking of the small piston 7, rendering the movement/removal of the label possible.

FIGURE 10 shows a perspective view of a further component characterizing the present electronic label 1. More in detail the figure in question shows that said electronic label 1

comprises at least one LED illumination system 14 on at least one side, preferably on both sides of the electronic label. The object of said LED illumination system 14, as well as the mode with which said illumination system operates, is that of effectively notifying the public regarding the existence of a particular commercial promotion/offer associated with the type  
5 of products at which the electronic label 1 is affixed.

FIGURE 11 shows a representative view of the modules 15 of the present kit of information systems for the support and power supply of electronic labels 1. More in detail, the figure in question shows that said kit comprises a plurality of modules 15 connectable in sequence due  
10 to a plurality of connectors 16 (by way of example, the figure shows the structure of only one connector 16). More in detail, the figure shows that each module 15 of the kit is connectable to a consecutive module 15 due to the insertion, between said consecutive modules 15, of a connector 16. The latter comprises more in detail two parallelepiped structures 16' and 16'' connected together due to three electrical wires 17 in turn connected  
15 to electrical contacts 18 exiting from said structures 16' and 16''. More in detail, from each of said parallelepiped structures, three electrical contacts 18 project that are adapted to contact the small electrical bars present on the tracks 19 verifiable on the internal surface 20  
20 of the central portion of each module 15. Hence, the connection of said modules 15 occurs by connecting a parallelepiped structure 16' or 16'' of a connector to one of the faces 20' or 20'' of a module 15 and connecting the remaining parallelepiped structure 16'' or 16' of the same connector 16 to the face 20' or 20'' of the consecutive module 15.

FIGURE 12 shows an enlarged, detailed and perspective view of a module 15 comprised in the present kit of information systems. More in detail, the figure in question shows the  
25 characteristic profile shaped like a [ of the longitudinal section of the modules 15. The figure shows that the module 15 comprises a lower portion 15'', an upper portion 15''' and a central portion 15' orthogonal to the others. Said three portions define, for each module 15, a structure without interruption having the aforesaid profile shaped like a [. Observable on the

lower portion 15'' is the convex projection 21 that rises upward along the front border of said lower portion 15''. Such projection 21 is suitable for the size-complementary adaptation with the groove 13 present in the lower portion of the electronic label 1 to be supported. Also verifiable on the upper surface of the lower portion 15'' are a plurality of small blind holes 5 22 adapted to allow the anchorage of the systems for locking the electronic label to be supported on the guide bar 200 resulting from the association of said modules 15. On the upper portion 15''' and in particular on the front border of said upper portion 15''', the projection 23 can be observed facing downward, it too adapted for contributing to the support of the supported label. On the internal surface 20 of the central portion 15', three 10 tracks 19 can instead be observed, on which small electrical bars are present which – when contacted by the tips of the electrical contacts 6 provided with each electronic label 1 – ensure the electrical power supply continuity between the label and the guide bar resulting from the joining of the modules 15, in a more extensive system of centralized power supply.

15 FIGURE 13 shows a representative view of the longitudinal section of an electronic label 1 supported by the guide bar resulting from the joining of the modules 15.

FIGURE 14 shows a front and representative view of an embodiment of the handle-like device 24 in the configuration in which said device is adapted for locking an electronic label 20 1 on a support guide bar (the guide bar is not shown in the figure in question). More in detail, the figure shows that said handle-like device 24 has a particular profile shaped like a [ and comprises: a central portion 25 and two lateral arms: a first lateral arm 26 and a second lateral arm 27. Both on the end 26' of said first arm 26 and on that 27' of said second lateral arm 27, the following are respectively present: the first permanent magnet 28 and the second 25 permanent magnet 29 respectively adapted to allow the locking and unlocking of the electronic label to/from the support guide bar. Said permanent magnet 28 in fact has its poles oriented in a manner such that: by approaching said permanent magnet 28 to the permanent magnet 12 fit on the transverse bar 11 inside the label 1, a repulsive action is exerted

between the poles of the magnets (of the same sign) which causes the movement of the transverse bar 11 within the label. Such movement involves that the lower projection 11', present on the transverse bar 11, contacts the head 7' of the small piston 7 which is enclosed by the spring 9 present in the lower portion of the label, engaging it in two holes (not visible  
5 in the figure in question) of which one is present on the lower surface of the label at said small piston 7 and the other on the support guide bar.

FIGURE 15 shows a front and representative view of the device 1 shaped like a handle in the case in which said device is spatially configured so as to grasp the electronic label 1, in order  
10 to remove it from the support guide bar (not visible in the figure in question). More in detail, the figure 15 shows that the unlocking of the electronic label 1, and in particular the disengagement of the small piston 7 from the aforesaid mating holes (not shown in the figure) occurs by moving the lower projection 11' of the bar 11 away from the head 7' of the small piston 7. The disengagement occurs upstream due to the attractive action that is  
15 exerted between the poles of opposite sign of the permanent magnet 12, fit on the bar 11, and of the second permanent magnet 29 present on the second lateral arm 27 of the device 1. Both in this and in the preceding figure, the directions of the arrows represented indicate the direction of the movement of the transverse bar 11 and of the small piston 7 in the case of locking and unlocking the electronic label 1 by the handle-like device 24. The latter, both in  
20 the case of locking and in that of unlocking, is always used by grasping the label. The identification of the configuration adapted to allow the locking of the electronic label 1 and of that adapted to allow the unlocking thereof occurs due to a chromatic indication present on at least one surface of at least one end of the arms 26 and/or 27 of the handle-like device 24. Preferably, the presence of a red chromatic indication verifiable on one side of the ends  
25 26' and 27' indicates the locking configuration of the label, otherwise the presence of a green chromatic indication, verifiable on the sides opposite those having the red chromatic indication, indicates the unlocking configuration of the electronic label 1. The passage from one configuration to the other occurs with a simple 180° rotation of the handle-like device

24.

FIGURE 16 shows a perspective view of the handle-like device 24 in its preferred embodiment. More in detail, the figure in question shows the presence of an indented portion 30 present at the magnetic end of each arm of said handle-like device 24. Both said indented portions are to be directed towards the sides of the electronic label 1 (not shown in the figure in question) in a manner such that said handle-like device 24 can allow grasping the electronic label 1 and suitably moving it on the supporting guide bar 200 (also not shown in the figure under examination). More in detail the figure in question shows the presence of an indented portion 30 at the end 26', comprising the first permanent magnet 28 of the first lateral arm 26, and an indented portion 30 at the end 27', comprising the second permanent magnet 29 of the second lateral arm 27. The figure in question also shows the presence of an articulation 31 between said first lateral arm 26 and said central portion 25, and of an articulation 31 between said second lateral arm 27 and said central portion 25.

In all embodiments thereof, the components of the kit of electronic information systems according to the present invention are made of metal and polymer and/or metal and composite materials.

Claims

## 1. Kit of electronic information systems comprising:

- 5 - at least one electronic label (1) comprising at least one support structure (2), like a printed circuit, in turn comprising at least one display (3) adapted to show the public the information associated with the product or type of products at which said electronic label (1) is placed, at least one controller (4) adapted for managing said display (3), for communicating with a power supply master (100), external and remote with respect to said electronic label (1), and for the diagnostics of the power supply voltage, of  
10 consumption, of the technical levels of the relative data, and of the effectiveness of the contacts;
- a plurality of modules (15) and a plurality of connectors (16) adapted for joining said modules (15), said joining resulting in an electrifiable guide bar (200) adapted for the support and wiring of said electronic labels (1), said modules comprising small  
15 electrical bars;
- at least one handle-like device (24) adapted to lock and unlock said electronic label/labels (1) to/from said guide bar (200),  
said kit of information systems being **characterized in that** said electronic label (1) communicates with said power supply master (100) in a bidirectional manner, said  
20 electronic label (1) being power-suppliable due to a common wired electrical grid and comprising at least one electronic/optical interface (5) for its connection to the communication guide lines, both electrical between labels (1) and master (100) and between labels (1) and operator terminal, and for its connection to the electrical power supply lines, said electronic/optical interface (5) comprising at least two power supply  
25 lines (5' and 5'') and at least one third bidirectional communication line (5''') adapted for the bidirectional data communication with a specific master (100), said power supply and bidirectional communication occurring due to an electrical connector adapted to ensure the constant electrical connection between said electronic label (1) and an



electrified guide bar (200) with which said electronic label (1) is reversibly connected, said electronic label (1) comprising an electrical connector having electrical contacts (6) provided with tips adapted to contact corresponding small electrical bars present on said electrified guide bar (200).

5

2. Kit of electronic information systems according to the preceding claim **characterized in that** the electronic label/labels (1) comprised therein comprises a reversible locking system adapted to prevent theft or the simple removal of said electronic label (1) from the electrified guide bar (200), said electronic label (1) comprising, in the body of its lower portion (10), a small nail-like piston (7) with the head (7') lying in the lower portion of a transverse channel (8), it too present in the body of said label (1) in the adjacent portion above said lower portion (10), said small piston (7) being enclosed by a spring (9) and being vertically movable and insertable in a hole below said small piston (7), said vertical movement occurring due to the horizontal movement of a transverse bar (11) comprised in the channel (8) of said electronic label/labels (1), said transverse bar (11) having, on the lower part, a projection (11'), adapted to press on the head (7') of the small piston (7), and a permanent magnet (12) fit on one end of said transverse bar (11), said channel (8) having at least one inlet/outlet perforation (8' and/or 8'') which makes possible the access of said transverse bar (11) to said channel (8), said fit permanent magnet (12) being situated at said inlet/outlet perforation (8' and/or 8''), said kit of information systems also being characterized **in that** said electronic label (1) has, on at least one of its sides, at least one LED illumination system (14), said LED illumination system (14) emitting signals with various illumination intensity, said signals being synchronizable by the master (100), said electronic label (1) also having, on the lower surface of the lower portion (10), at least one groove (13) adapted to allow the adaptation of said electronic label (1) on a corresponding and complementary border present on said guide bar (200).

10

15

20

25

3. Kit of electronic information systems according to the preceding claims **characterized in that** each of said modules (15) is a structure comprising a lower portion (15''), a flat upper portion (15''') that is parallel to said lower portion (15'') and a central portion (15') orthogonal to said lower portion (15'') and to said upper portion (15'''), said three  
5 portions representing a continuum, said lower portion (15'') having a convex projection (21) that rises upward along the front border of said lower portion (15'') and also having a plurality of small holes (22) arranged in series and parallel to said convex projection (21), said upper portion (15''') having, along its external border, a projection (23) facing downward, said central portion (15') having on its internal surface (20) at least three  
10 electrical power supply tracks (19), each of said tracks (19) having a small electrical bar adapted to be contacted by the tips of said electrical contacts (6) of the electronic label to be supported, said each module (15) having a longitudinal section shaped like a [, each module (15) having three open faces, each module (15) being connectable to another module (15) due to said connectors (16), each connector (16) comprising at least two  
15 parallelepiped structures (16') and (16'') connected to at least three electrical wires (17), each electrical wire (17) being connected to a corresponding electrical contact (18) exiting from each of said parallelepiped structures, each electrical contact (18) being adapted to contact the corresponding small electrical bar present on said track (19).
- 20 4. Kit of electronic information systems according to the preceding claims **characterized in that** said handle-like device (24) has a profile shaped like a [, said handle-like device (24) comprising a central portion (25) and two lateral arms, said lateral arms being a first lateral arm (26) and a second lateral arm (27), said first lateral arm also having one end (26') comprising a first permanent magnet (28) and said second lateral arm (27) having  
25 one end (27') comprising a second permanent magnet (29), said first permanent magnet and said second permanent magnet being adapted for locking/unlocking said electronic label/labels (1) to/from said guide bar (200), said locking/unlocking occurring via repulsive and attractive magnetic interaction between the poles of said permanent

magnet (12) fit on said transverse bar (11) and those of said first permanent magnet (28) and said second permanent magnet (29), said handle-like device (24) also having, on at least one side of the end (26') and (27'), at least one chromatic indication associated with the locking of said electronic label (1) and having on the opposite side of said ends  
5 a different chromatic indication indicating the unlocking of said electronic label (1), said handle-like device (24) also having an indented portion (30) present at the magnetic end of each arm of said handle-like device (24), each indented portion (30) having the indentation facing towards the sides of said electronic label (1).

10 5. Kit according to the preceding claim **characterized in that** the tips of the electrical contacts (6) of the electronic label (1) comprised in said kit are made of metallic/elastic alloy material.

6. Kit of electronic information systems according to any one of the claims 1 to 5  
15 **characterized in that** the electronic label/labels (1) comprised therein comprises a thrust spring (6'), at each of the tips of the electrical contacts (6), said thrust spring (6') being adapted to ensure the continuity of the electrical connection over time.

7. Kit of electronic information systems according to any one of the preceding claims  
20 **characterized in that** the display (3) of the electronic label/labels (1) comprised therein is of standard LCD type or e-paper type and is provided with a protective screen (3') made of optically transparent material, **in that** the LED illumination system (14) comprises LEDs of various color and various illumination intensity **and in that** all the components comprised in said electronic label (1) are enclosed in a casing.

25

8. Kit of electronic information systems according to any one of the preceding claims **characterized in that** the components comprised therein are made of a combination of metal and polymer materials or metal and composite materials.

9. Use of the kit of electronic information systems according to any one of the preceding claims inside public commercial sites such as shopping malls, stores and the like operating in the food distribution field, said kit being adapted to provide information regarding the products on sale that are displayed on the shelving inside said commercial sites.
10. Electronic label (1) comprising at least one support structure (2), like a printed circuit, in turn comprising: at least one display (3), of standard LCD type or e-paper adapted to show the public the information associated with the product or with the type of products at which said electronic label (1) is placed; at least one controller (4) adapted for managing said display (3), for the communication with a power supply master (100), external and remote with respect to said electronic label (1), and for the diagnostics of the state of the power supply voltage, of the consumption, of the technical levels of the data, of the effectiveness of the contacts and of the ambient temperature monitoring, said electronic label (1) being **characterized in that** its communication with said power supply master (100) occurs in a bidirectional manner, said electronic label (1) being power-suppliable due to a common wired electrical grid and comprising at least one electronic/optical interface (5) for its connection to the communication line, both electrical between labels and master (100) and between labels and operator terminal, and to the electrical power supply line, said electronic/optical interface (5) comprising at least two power supply lines (5' and 5'') and at least one third bidirectional communication line (5''') adapted for the bidirectional data communication with a specific master (100), said power supply and bidirectional communication occurring due to an electrical connector adapted to ensure the constant electrical connection between said electronic label (1) and an electrified guide bar (200) with which said electronic label/labels (1) is reversibly connected, said electronic label (1) comprising an electrical connector having electrical contacts (6) provided with tips made of elastic metal material

adapted to contact the corresponding small electrical bars present on said electrified guide bar (200), said electronic label (1) also being characterized **in that it** comprises a reversible locking system adapted to prevent the theft or simple removal of said electronic label (1) from the electrified guide bar (200) by non-authorized personnel,

5 said electronic label comprising, in the body of its lower portion (10), a small nail-like piston (7) with the head (7') lying in the lower portion of a transverse channel (8), it too present in the body of said label (1) in the adjacent portion above said lower portion (10), said small piston (7) being enclosed by a spring (9) and being vertically movable and being insertable in two corresponding holes: the first present in the body of the label

10 (1) below said small piston (7), the other corresponding to the first and being present on the electrified guide bar (200) to which said electronic label (1) is connected, said vertical movement occurring due to the horizontal movement of a transverse bar (11) comprised in the channel (8) of said label (1), said transverse bar (11) having on the lower part a projection (11') adapted to press on the head (7') of the small piston (7),

15 said channel (8) having at least one inlet/outlet (8' and/or 8'') which makes possible the access of said transverse bar (11) to said channel (8), said transverse bar (11) having a permanent magnet (12) fit on one end of said transverse bar (11) at said inlet/outlet perforation (8' and/or 8''), said electronic label (1) also being characterized **in that it** comprises, on at least one of its sides, at least one LED illumination system (14)

20 comprising LEDs of various color and illumination intensity, said LED illumination system (14) emitting signals with various illumination intensity, said signals being synchronizable by the master (100), said electronic label (1) also having, on the lower surface of the lower portion (10), at least one groove (13) adapted to allow the adaptation of said electronic label (1) on a corresponding and complementary border

25 present on the electrified guide bar (200).

11. Modules (15) for the support and wiring of electronic labels (1), each module (15) comprising a lower portion (15''), a flat upper portion (15''') that is parallel to said lower

portion (15'') and a central portion (15') orthogonal to said lower portion (15'') and to said upper portion (15'''), said three portions representing a continuum, said lower portion (15'') having a convex projection (21) that rises upward along the front border of said lower portion (15'') and also having a plurality of small holes (22) arranged in series and parallel to said convex projection (21), said upper portion (15''') having, along its external border, a projection (23) facing downward, said central portion (15') having on its internal surface (20) at least three electrical power supply tracks (19), each of said tracks (19) having a small electrical bar adapted to be contacted by the tips of said electrical contacts (6) of the electronic label to be supported, said each module (15) having a longitudinal section shaped like a  $\sqcap$ , each module (15) having three open faces, each module (15) being connectable to another module (15) due to common connectors that ensure electrical continuity between said modules (15).

12. Handle-like device (24) for locking and unlocking electronic labels (1) to/from guide bars (200) resulting from the association of modules (15), said handle-like device (24) having a profile shaped like a  $\sqcap$ , said handle-like device (24) comprising a central portion (25) and two lateral arms, said lateral arms being a first lateral arm (26) and a second lateral arm (27), said first lateral arm also having one end (26') comprising a first permanent magnet (28) and said second lateral arm (27) having one end (27') comprising a second permanent magnet (29), said first permanent magnet and said second permanent magnet being adapted for locking/unlocking of said electronic label/labels (1) to/from said guide bar (200), said locking/unlocking occurring via repulsive and attractive magnetic interaction between the poles of a permanent magnet (12) fit on a transverse bar (11) within the label and those of said first permanent magnet (28) and said second permanent magnet (29), said handle-like device (24) also having, on at least one side of the end (26') and (27'), at least one chromatic indication associated with the locking of said electronic label (1) and having, on the opposite side of said ends a different chromatic indication indicating the unlocking of said electronic

label (1), said handle-like device (24) being **characterized in that** it has an indented portion (30) present at the magnetic end of each arm of said handle-like device (24), each indented portion (30) having the indentation facing towards the sides of said electronic label (1).

1/9

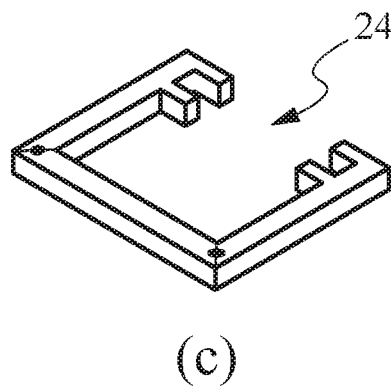
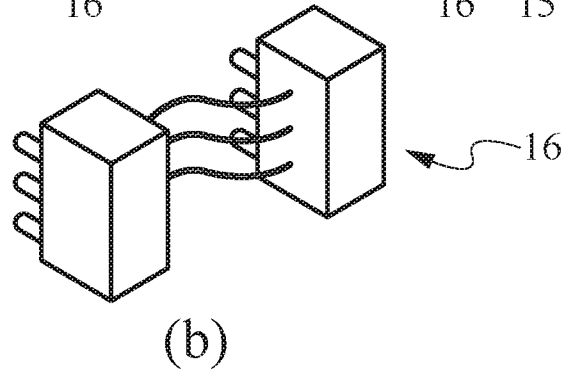
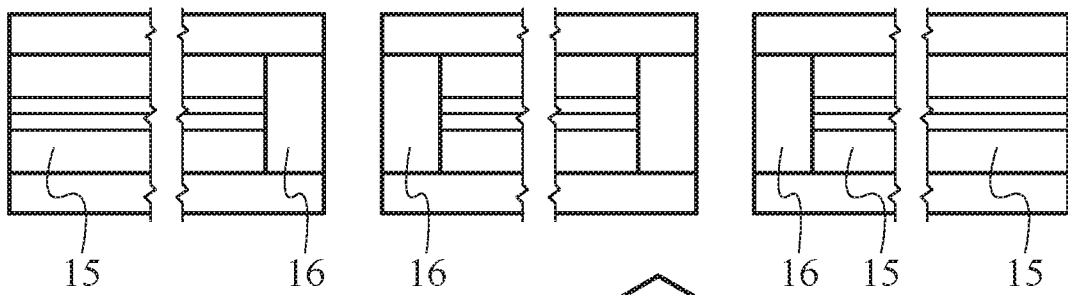
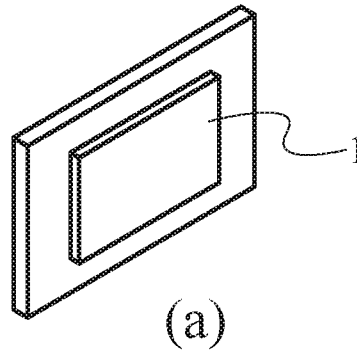


Fig. 1



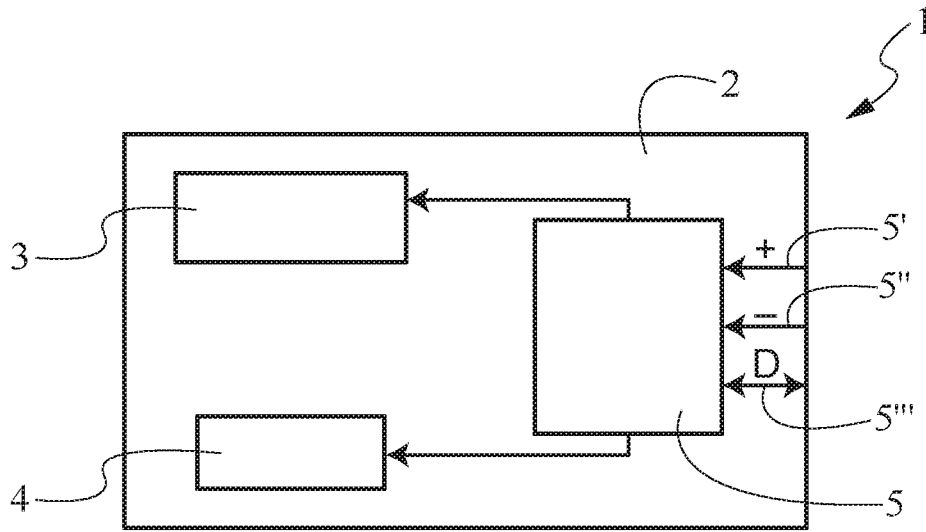


Fig. 2

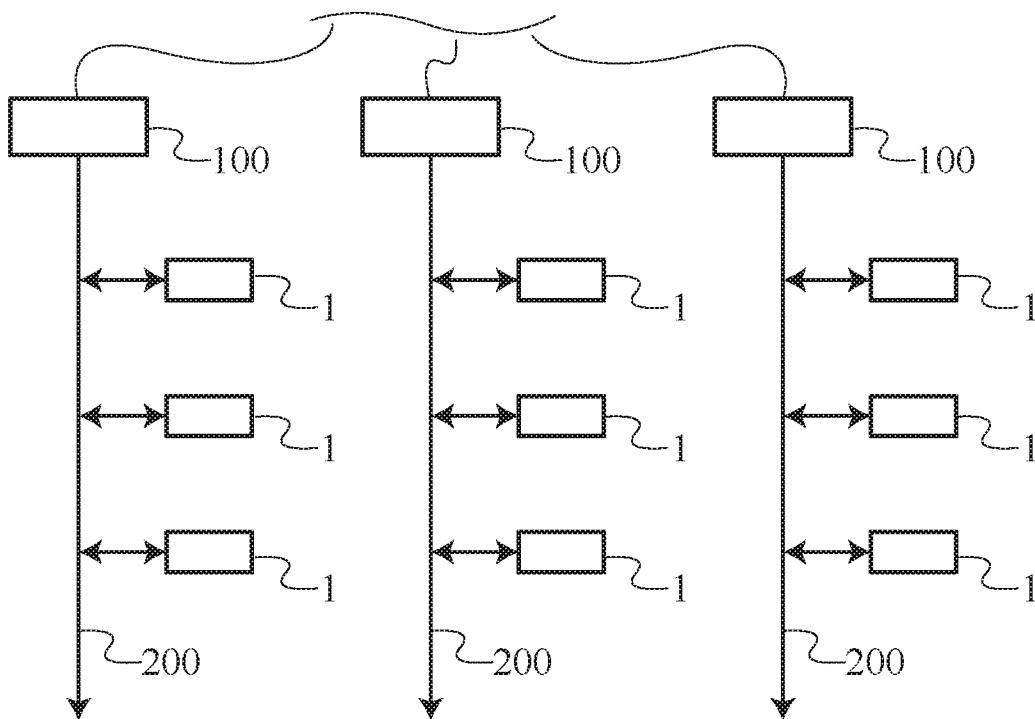


Fig. 3

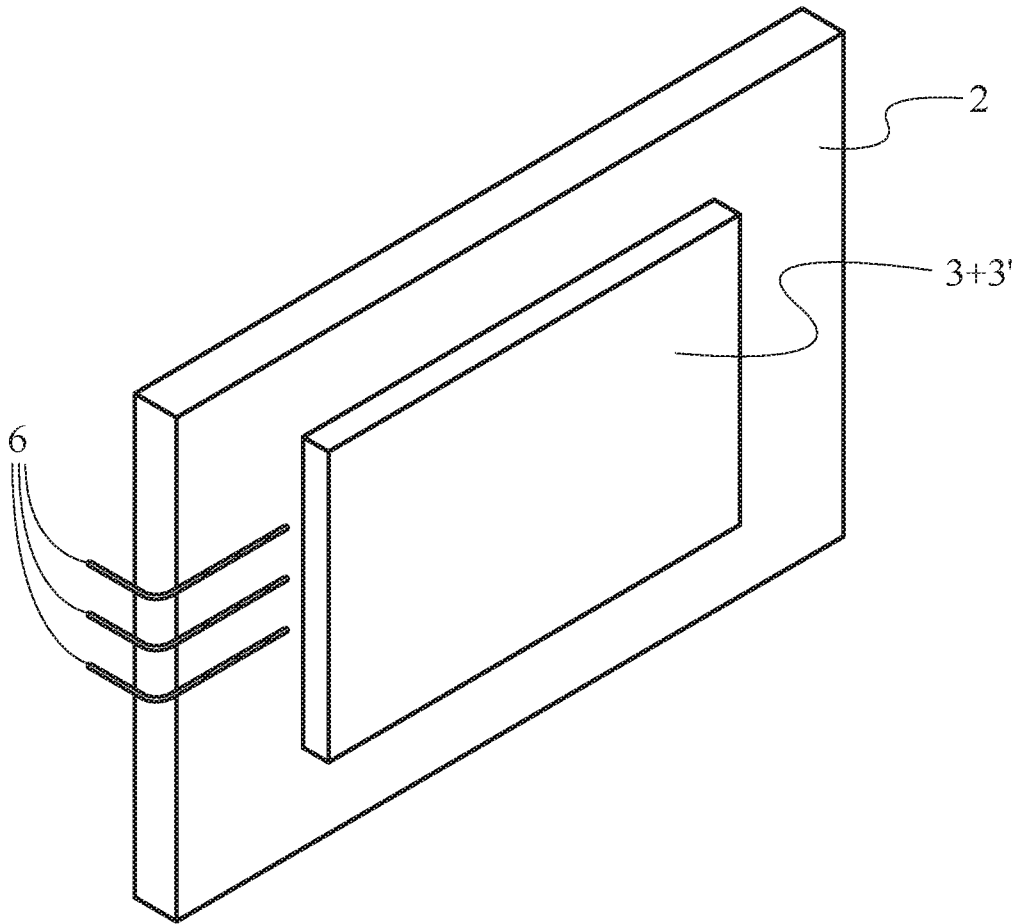


Fig. 4

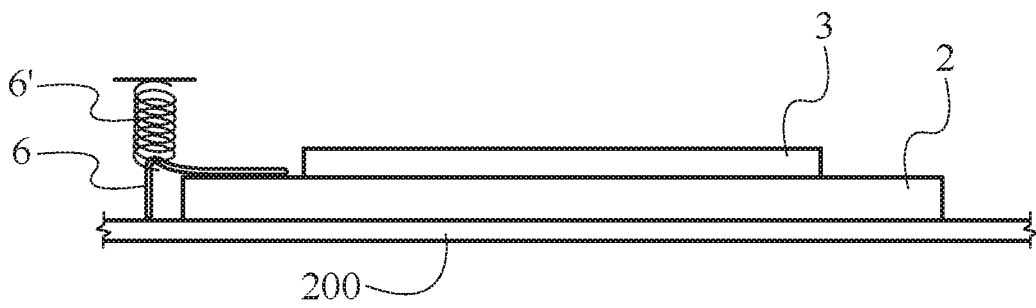


Fig. 5

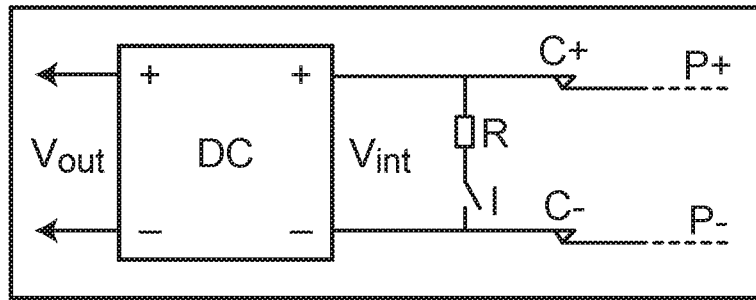


Fig. 6

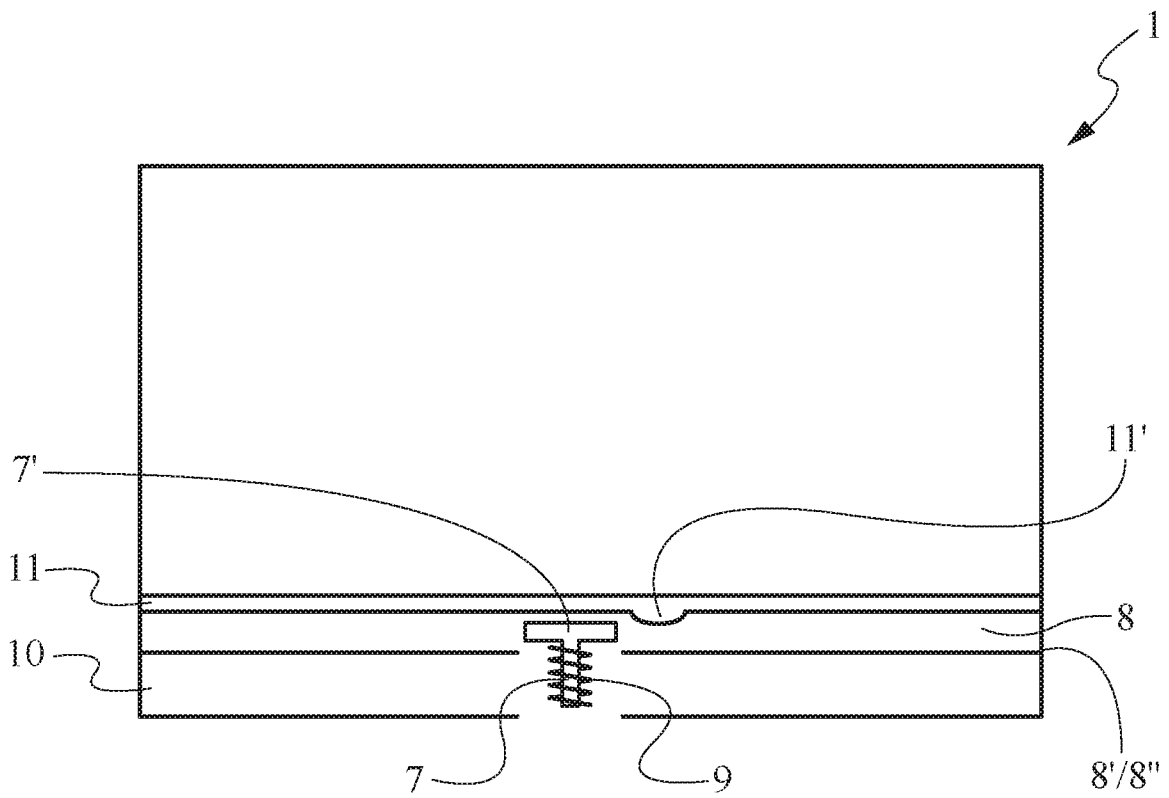


Fig. 7

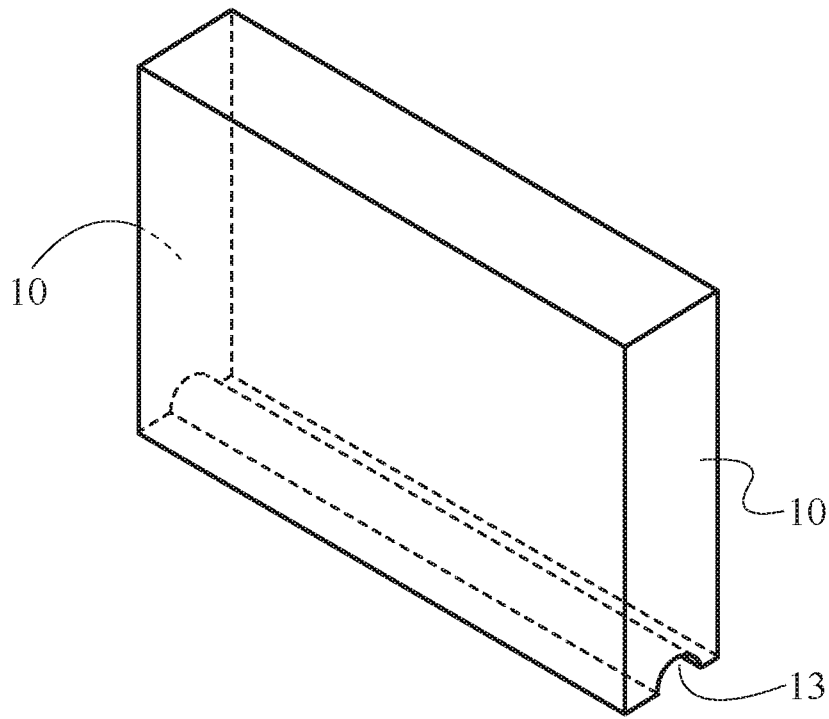


Fig. 8

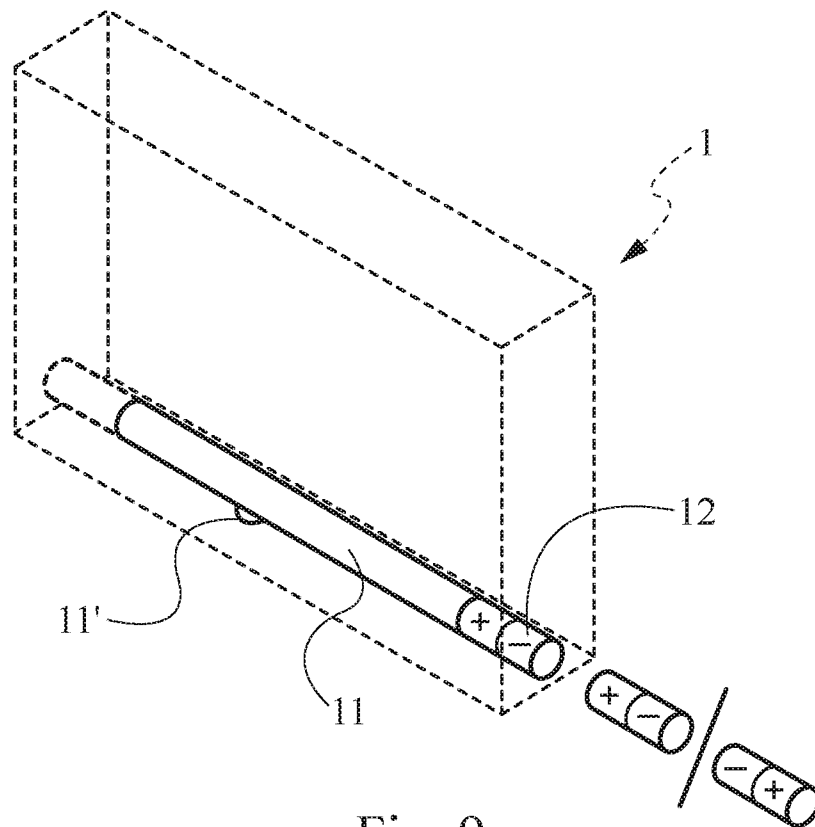


Fig. 9

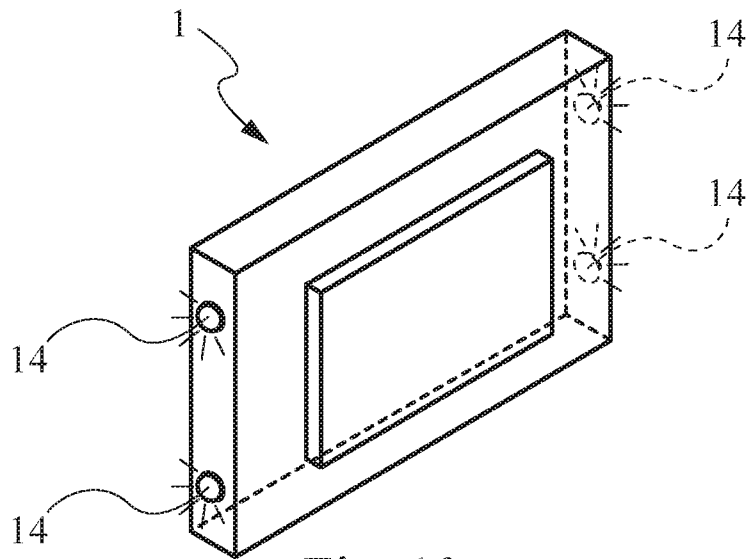


Fig. 10

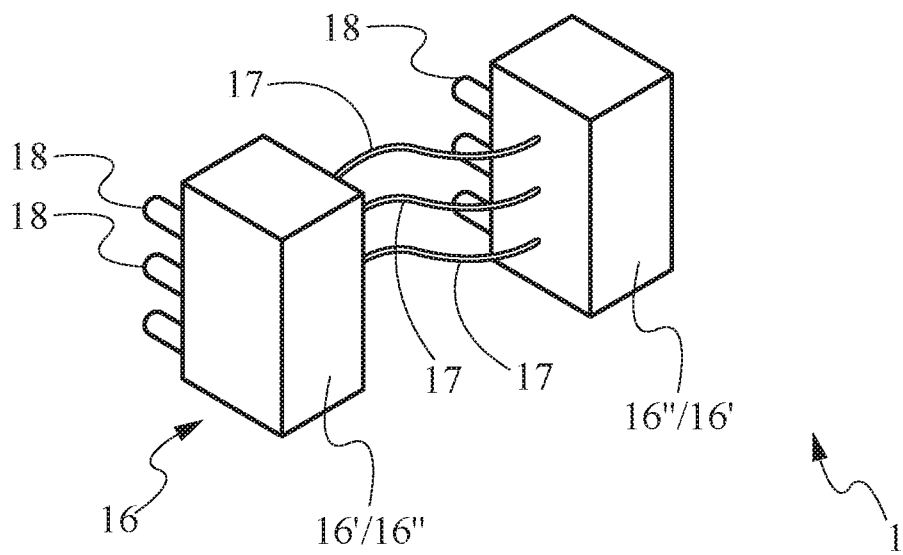
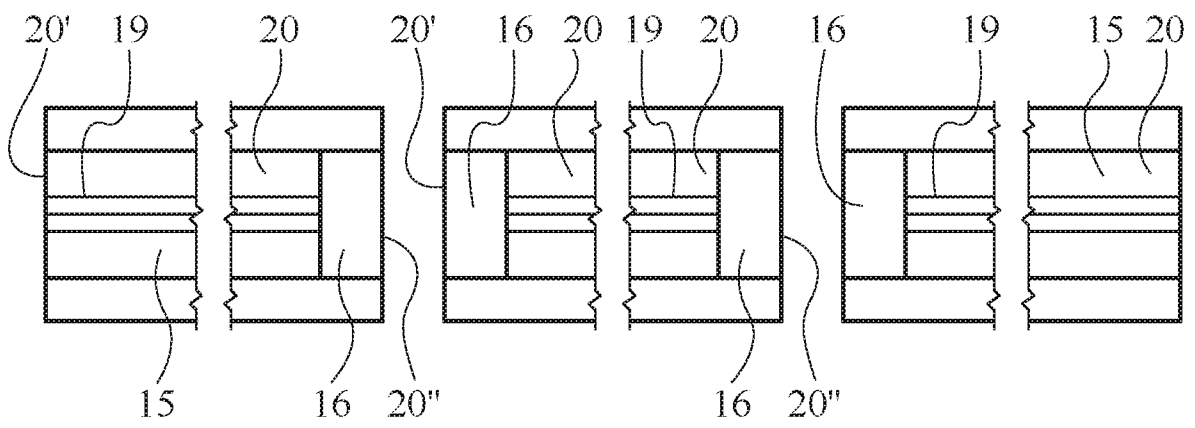


Fig. 11

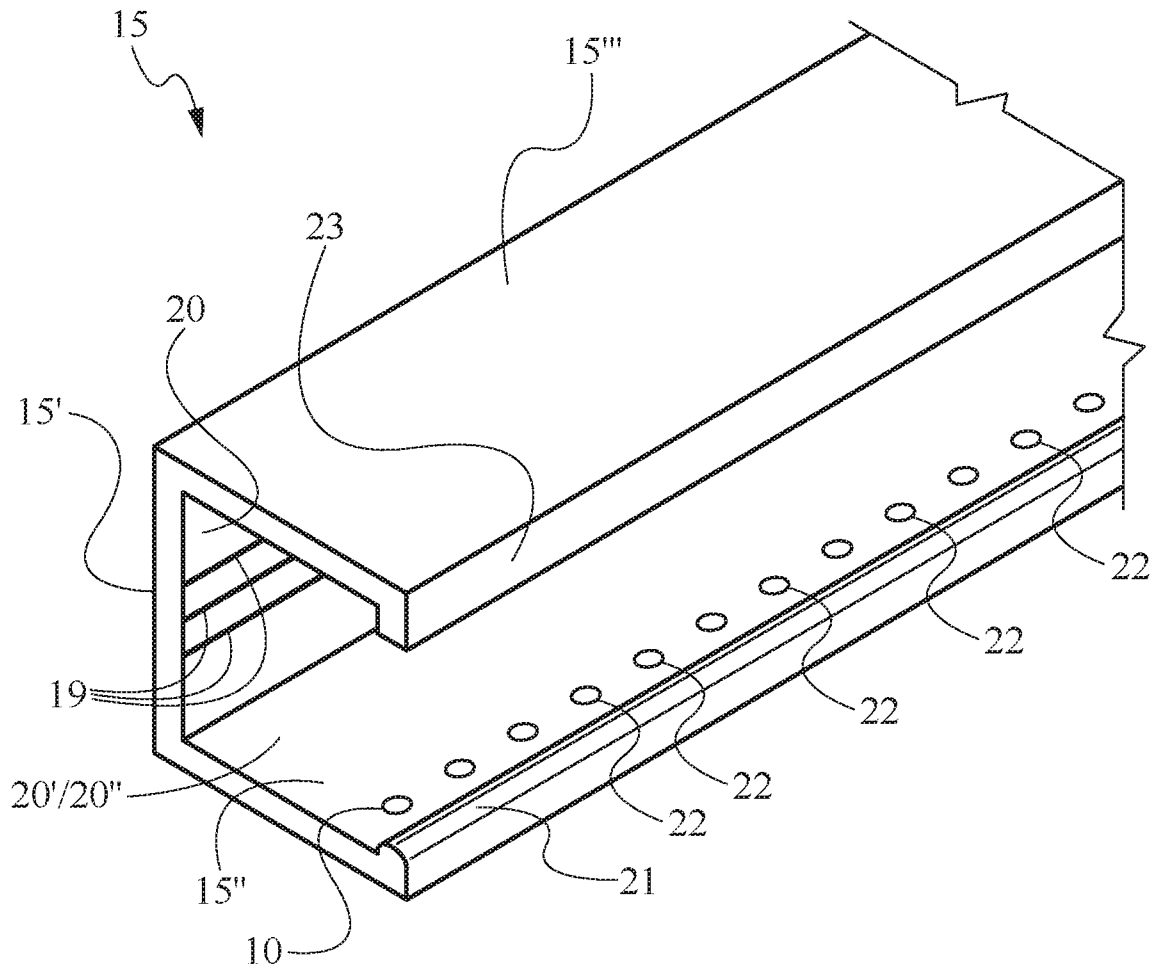


Fig. 12

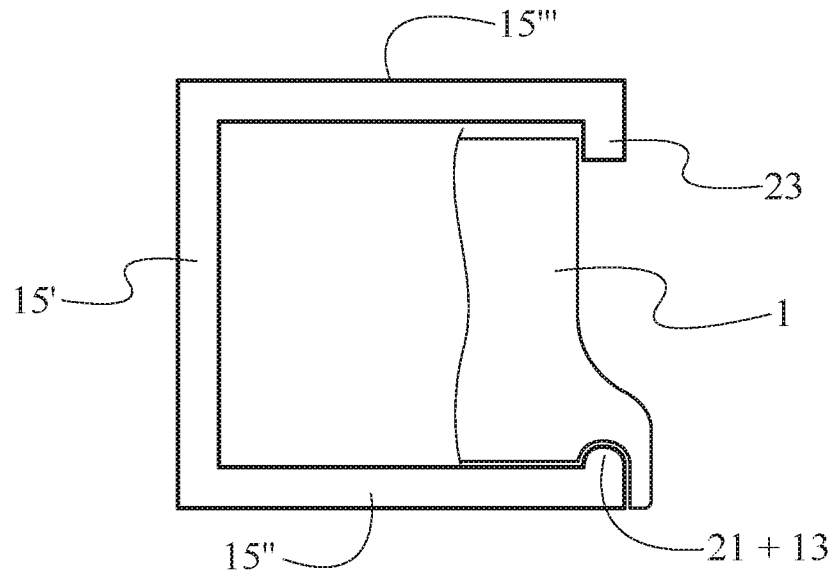


Fig. 13

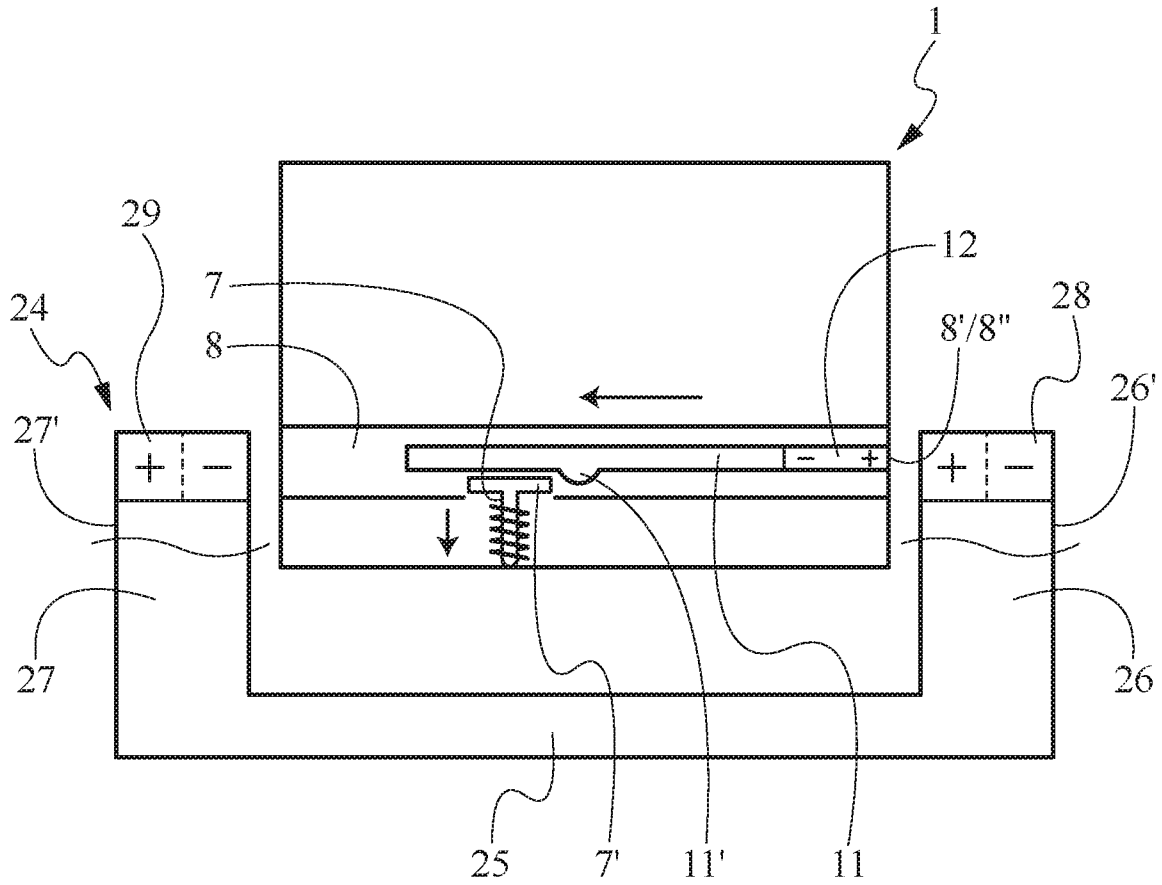


Fig. 14

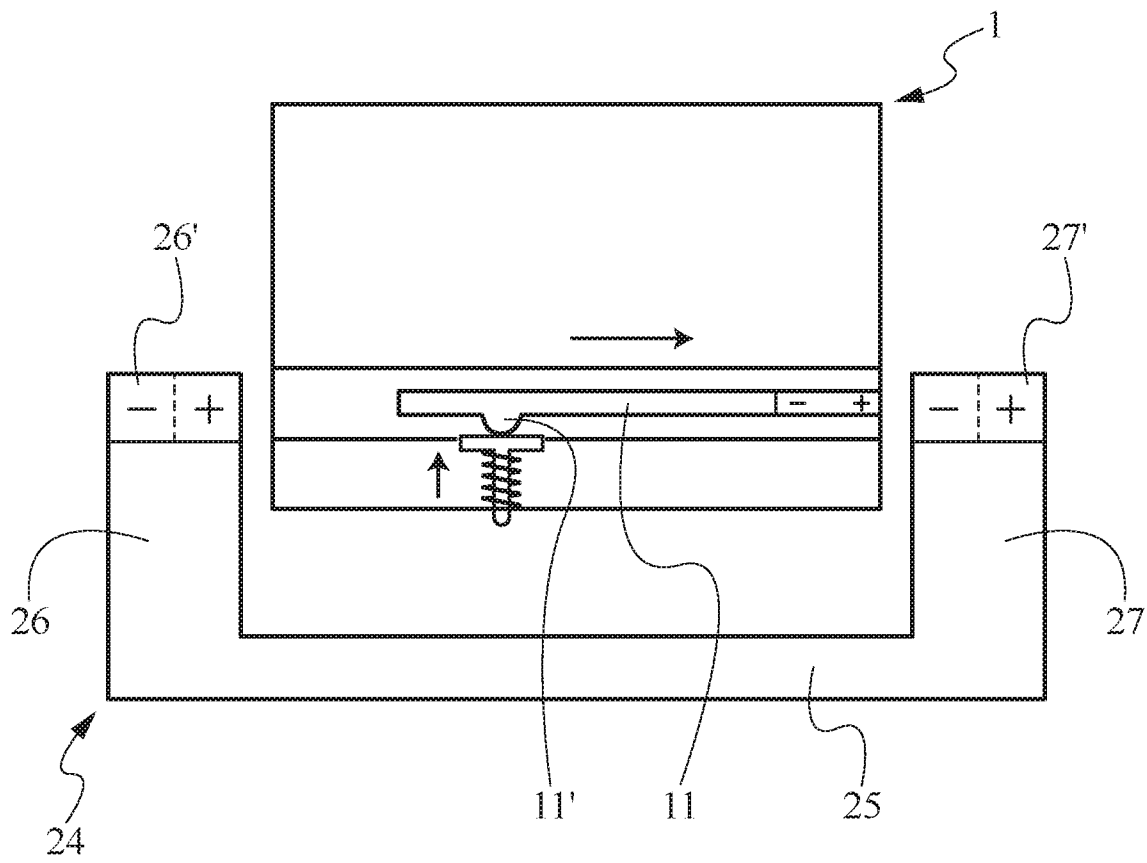


Fig. 15

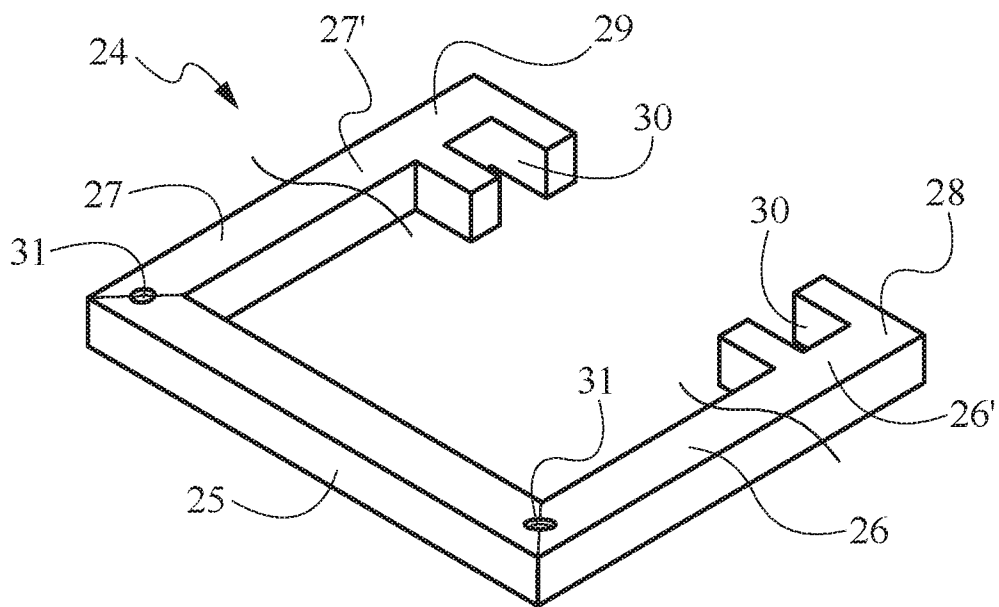


Fig. 16



**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/IB2017/050388

A. CLASSIFICATION OF SUBJECT MATTER  
INV. G09F3/20 G06Q30/02  
ADD.  
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)  
G09F G06Q  
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99/03174 A1 (WHITAKER CORP [US]; HUIN THIERRY [FR]; VOGEL FREDERIC [FR]) 21 January 1999 (1999-01-21) page 1, line 1 - page 3, line 33; figures 1-12 -----	1,3,5-9, 11
X	WO 2015/083005 A2 (OPTICON SENSORS EUROP [NL]) 11 June 2015 (2015-06-11) paragraphs [0020] - [0030] -----	1,3,5-9, 11
A	US 5 473 832 A (BRIECHLE GEORGE T [US] ET AL) 12 December 1995 (1995-12-12) the whole document -----	1-12

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search <b>7 April 2017</b>	Date of mailing of the international search report <b>20/04/2017</b>
--	---

Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <b>Falò, Luca</b>
--	---

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2017/050388

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9903174	A1	21-01-1999	
		AU 8030798 A	08-02-1999
		DE 69804822 D1	16-05-2002
		DE 69804822 T2	28-11-2002
		EP 1012926 A1	28-06-2000
		WO 9903174 A1	21-01-1999
-----			
WO 2015083005	A2	11-06-2015	NONE
-----			
US 5473832	A	12-12-1995	NONE
-----			