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(54) **Control panel with push buttons for controlling electric plants**

(57) A control push-button station for plants comprises a box-like body (2) housing therein a plurality of electric contacts for one or more circuits of the plant, and having a side wall (3) upperly closed by an upper wall (4), an emergency button (6) located on said upper wall (4) and electrically connected to at least one first pair of electric contacts, at least one electric device (7, 8, 9, 10) located on the upper wall (4) and electrically connected to at least one second pair of electric contacts. The control push-button station comprises a protection cover (12) adapted to be movably associated with the box-like body (2) to move between an open position in which the electric device (7, 8, 9, 10) is accessible and a closed position in which the electric device (7, 8, 9, 10) is not accessible to an operator, with the emergency button (6) being accessible in both open and closed positions.

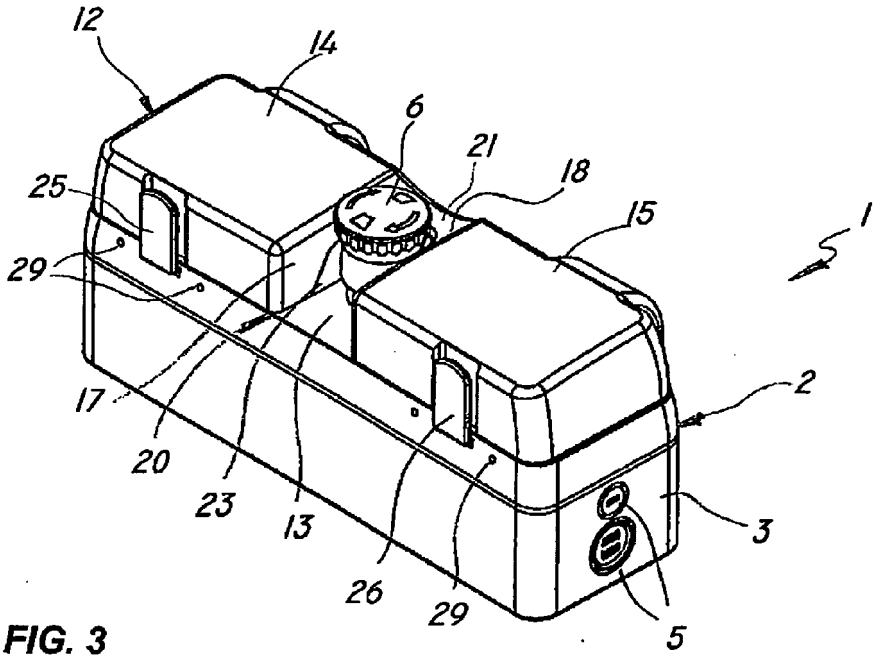

FIG. 3

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Description

Field of the invention

[0001] The present invention generally finds application in the field of electric devices for controlling people and/or material transportation and handling plants and particularly relates to a control push-button station for plants, particularly for controlling and handling elevators during maintenance and inspection of the hoistway.

Background art

[0002] Multi-control push-button stations for controlling and handling civil or industrial plants, such as elevators, hoists, cranes, bridge cranes, and the like, comprise a box-like enclosure containing a plurality of electric contacts for connecting the push-button station to the power and service circuits of the plant.

[0003] The push-button station is also equipped with a plurality of switches or controls connected to as many electric contacts for controlling the movements of the plant or switching from one operating state thereof to another.

[0004] Certain particular push-button stations, one of which is disclosed, for instance, in US 2003/0010576 A1, are equipped with an emergency button, generally of the mushroom or push-pull type, for immediately cutting off power to the plant or a part thereof, to set it to a safe state.

[0005] Other prior art types of push-button stations have an electrical outlet integrated therein for connecting and supplying power to portable devices, such as lamps or tools that might be useful to operators, during inspection or maintenance procedures.

[0006] A first drawback of these prior art push-button stations is that they have no adequate protection from the weather or the dirt that is typically found in their operating environments, such as building sites and hoistways.

[0007] Accordingly, before each use, operators must often clean the push-buttons to make sure of their functions and ensure proper operation.

[0008] It shall be also apparent that a lack of adequate protection may also cause malfunctioning of the push-button station, due to infiltrations of water and dirt.

[0009] Therefore, these push-button stations cannot be even used when the rooms in which they have to be located are subject to flooding, and when the push-button station is required to be resistant to immersion, to allow emergency handling of the plant being served even in the presence of water or in flooding conditions.

[0010] One example of this application is a push-button station located at the bottom of a hoistway, which has to be hermetically sealed.

[0011] For this purpose, elevator plants are known, for instance from JP 2006-036405, in which the control panel can slide in the hoistway and be inserted into a hermetically sealed outer enclosure.

[0012] In addition to their complexity in manufacturing and operation, these solutions do not allow immediate access to the push-button station and particularly do not always allow access to the emergency button, as required by certain regulations about management of these plants.

[0013] An additional drawback of prior art solutions is that common push-button stations do not have adequate protection against careless use by inspection or maintenance operators in the plants being served.

[0014] For instance, the push-button stations that are used for hoistway inspection or car maintenance, which are generally mounted to the car itself or at the bottom of the pit are often inappropriately used by operators as footboards to reach higher positions or are inadvertently trampled during normal maintenance.

[0015] As a result, they are often subject to excessive stress and shocks that can easily cause failure. Furthermore, such careless behavior may lead to unintentional toggling of the emergency button or other control devices, with consequent risks for the operators.

[0016] For this purpose, certain solutions have been developed for providing push-button stations with adequate protection against negligent use. For example, JP 2003-238053 and US 7568557 B2 disclose elevator cars having a normally closed compartment in the roof, which can be opened from the outside during maintenance, and with the push-button station and the control panel held therein.

[0017] While these solutions provide the push-button station with adequate protection both against dirt and against inappropriate use, they are still complex and expensive as they require a special car design, with a heavier construction. Furthermore, use and replacement of a push-button station located in the compartment are difficult and unpractical.

[0018] Also importantly, commonly available push-button stations have an unattractive appearance, which prevents them from being exposed to the view when technical function has to be combined with aesthetics, such as in hoistways with glass walls that make their interior visible.

Disclosure of the invention

[0019] The object of the present invention is to overcome the above drawbacks, by providing a control push-button station for plants, particularly elevators or the like, that can be manufactured in a simple and relatively inexpensive manner.

[0020] A particular object is to provide a control push-button station for plants that ensures protection of the push-buttons and other control elements, both against the weather and dirt and against careless use by an operator.

[0021] A further particular object is to provide a hermetically sealed push-button station, that allows operation on the plant even in the presence of water.

[0022] Yet another object of the present invention is to provide a control push-button station for plants that has a particular pleasant appearance for applications designed to be exposed to the view.

[0023] These and other objects, as more clearly explained below, are fulfilled by a control push-button station for plants as defined in claim 1, which comprises a box-like body adapted to be associated with a fixed or movable part of a plant to be controlled and houses thereinside a plurality of fixed and/or movable electric contacts for one or more power and/or service circuits of the plant, said box-like body having a side wall upperly closed by an upper wall, an emergency button located on said upper wall and electrically connected to at least one first pair of said electric contacts for at least partially opening/closing the power circuit of the plant, at least one electric device located on said upper wall of said box-like body and electrically connected to at least one second pair of said electric contacts for its connection with a corresponding power and/or service circuit and control thereof.

[0024] The push-button station is characterized by comprising a protection cover, which is adapted to be movably associated with said box-like body for moving between an open position in which said at least one electric device is accessible to an operator and a closed position wherein said at least one electric device is not accessible to the operator.

[0025] The cover is also configured to allow said emergency button to be always accessible both in said open position and in said closed position.

[0026] Due to these particular features of the invention, when the push button is not operating, the one or more electric devices therein, such as switches, circuit breakers, electric controls or power outlets, will be constantly protected from the weather and dirt.

[0027] Therefore, the push-button station has increased efficiency and reliability, is readily usable and has lower maintenance requirements.

[0028] Furthermore, constant accessibility of the emergency button will provide compliance with applicable regulations, while ensuring constant protection of the emergency button from careless behavior. The push-button station of the invention is also safer than prior art solutions.

[0029] Conveniently, the cover may be hinged to the box-like body about an axis of rotation that is either substantially parallel and transversely offset to a longitudinal direction of extension of the box-like body, or substantially orthogonal to said longitudinal direction.

[0030] Thus, the configuration of the push-button station may be selected according to each particular application and the environment it is designed for, while always ensuring all the above advantages.

[0031] Advantageously, hermetically sealing means are provided, which are associated with the box-like body and/or the cover to protect the electric devices from contact with liquids, when the cover is in said closed position.

[0032] Due to this peculiar feature of the invention, the push-button station may be used in particularly moist places, and in flooding conditions, with the same function being preserved.

[0033] The hermetically sealing means may be also designed to configure a push-button station with IP67 protection according to the UNI EN 60529 standard, to comply with the requirements of standards EN81/72 and EN81/74 for firefighters' and high passenger traffic elevators.

[0034] Advantageous embodiments of the push-button station are defined by the dependent claims.

Brief description of the drawings

[0035] Further characteristics and advantages of the invention will be more apparent upon reading the detailed description of a preferred, non-exclusive embodiment of a push-button station of the present invention, which is described as a non-limiting example with the help of the accompanying drawings, in which:

FIG. 1 is a view of a particular application of a pair of push-button stations of the invention in a first preferred configuration, which are held in a hoistway;

FIGS. 1A and 1B are details of Fig. 1, showing enlarged perspective views of the push-button stations mounted to the elevator car C and the hoistway H of Fig. 1;

FIG. 2 is a perspective view of one of the push-button stations of Fig. 1 with the cover 12 in the open position;

FIG. 3 is a perspective view of the push-button station of Fig. 2 with the cover 12 in the closed position;

FIG. 4 is a front view of the push-button station of Fig. 3 with the emergency button 6 off;

FIG. 5 is a front view of the push-button station of Fig. 3 with the emergency button 6 on;

FIG. 6 is a top view of the push-button station of Fig. 3;

FIG. 7 is a perspective view of one of a push-button station of the invention in a second preferred configuration, with the cover 12 in the open position;

FIG. 8 is a perspective view of the push-button station of Fig. 7 with the cover 12 in the closed position.

Detailed description of a preferred embodiment

[0036] As shown in Fig. 1, the push-button station of the invention, generally designated by numeral 1, may be mounted to the car C of an elevator plant, preferably to its exterior, for control and handling thereof, during inspection or maintenance of the car C and/or the hoistway H.

[0037] The push-button station 1 may be also located at the bottom of the pit P of the hoistway H for usual inspection and/or maintenance of the hoistway H itself.

[0038] Obviously, the push-button 1 may be used in combination with any kind of handling or transport plant

such as, without limitation, hoists, escalators or corridors, cranes, bridge cranes and the like, in a manner that is known to the skilled person and will not be described in further detail herein.

[0039] A push button station 1 of the invention comprises a box-like body 2 adapted to be attached to a fixed or movable part of the plant to be served, and housing therein a plurality of fixed and/or movable electric contacts, not shown and known per se.

[0040] The types and numbers of electric contacts may be selected according to the configuration of the plant to be served, as is obvious to the skilled person.

[0041] The box-like body 2 has a substantially prismatic side wall 3, upperly closed by a substantially flat upper wall 4.

[0042] The side wall 3 may have one or more removable portions 5 to allow connection of the electric contacts to one or more power and/or service circuits of the plant, also not shown.

[0043] An emergency button 6 is located on the upper wall 4 of the box-like body 2 and is electrically connected to at least one first pair of electric contacts, which are adapted to connect it to the power circuit of the plant for cutting off/turning on the latter or a part thereof.

[0044] The emergency button 6 in the figure is of the mushroom type, with a fixed cylindrical lower portion 6' and a movable upper portion 6". The button 6 can be triggered and/or reset either by pushing and pulling the movable portion 6" or through a rotational and translational motion thereof.

[0045] It shall be understood that the emergency button 6, which is shown by way of example and without limitation, may be replaced by any other type of emergency button compatible with the application for which the push-button station 1 is designed.

[0046] For instance, as the emergency button 6 is triggered, it can cause cutoff of either the entire plant or a part thereof, such as the elevator car C, with one or more emergency and/or service circuits being left on.

[0047] Further electric devices may be also located on the upper wall 4 of the box-like body 2, and be electrically connected in a known manner to corresponding pairs of electric contacts, for connection to corresponding power and/or service circuits of the plant for control or monitoring thereof.

[0048] The configurations of the figures show a selector 7, which is designed to switch the plant between normal operation and inspection operation, a pair of buttons 8, 9 for controlling the up and down movement of the car C and a multipurpose button 10, having two or three purposes, for managing the signaling circuits.

[0049] An outlet 11 is also provided for possible connection and power supply to an additional external electric device, not shown, such as a service lamp or an electrical tool, to provide the plant maintenance or inspection operator with a voltage source near the operating area.

[0050] Obviously, the configuration and arrangement of electric devices are suggested merely by way of example and without limitation, a greater or smaller number of such devices, or devices of different types, shapes and/or functions being possibly provided, according to each particular application.

[0051] The box-like body 2 is also equipped with a protective cover 12, which is adapted to be associated in a fixed or removable manner to its side wall 3, and is anyway movable between an open position, as shown in Fig. 2, in which the electric devices 7, 8, 9, 10, 11 are accessible from the outside, and a closed position, as shown in Figs. 3 to 6, in which the electric devices 7, 8, 9, 10, 11 are protected and inaccessible from the outside.

[0052] The cover 12 is also configured to allow the emergency button 6 to be always accessible both when the cover 12 is in the open position and when it is in the closed position.

[0053] In the configuration of Figs. 2 to 6, the cover 12 is hinged to the side wall 3 along a predetermined axis of rotation R. The box-like body 2 substantially extends in a direction of longitudinal extension L to a predetermined length l.

[0054] The axis of rotation R of the cover 12 is substantially parallel and transversely offset to the longitudinal direction L of extension of the box-like body 2.

[0055] In this case, the cover 12 will preferably have a longitudinal extension e substantially coincident with the predetermined length l of the box-like body 2 or its upper wall 4.

[0056] Nevertheless, the cover 12 may be placed in other positions, for instance hinged along an axis of rotation substantially orthogonal to the longitudinal direction L of the box-like body 2, although this is not shown.

[0057] Furthermore, the box-like body 2, which is shown with a substantially rectangular shape, may also have a different shape, e.g. a square or polygonal shape, without limitation to the scope of the present invention.

[0058] Irrespective of the direction of the axis of rotation R of the cover 12, the emergency button 6 may be located at either the center or the periphery of the upper wall 4.

[0059] In the first illustrated configuration, the button 6 is in a substantially central area 13 and the cover 12 has a pair of longitudinal closure portions 14, 15, offset along the longitudinal axis of extension L. Thus, the cover defines a central opening 16 that, with the cover 12 closed, is designed to overlap the central area 13 with the emergency button 6, and to coincide therewith.

[0060] As more clearly shown in Figs. 4 and 5, at least at the central opening 16, the height h of the cover 12 is smaller than the height h', h" of the emergency button 6 in the off state of Fig. 4 and the on state of Fig. 5 respectively.

[0061] This will always allow comfortable grasp of the emergency button 6 by an operator, with the cover 12 either in the open or in the closed position.

[0062] The longitudinal portions 14, 15 of the cover 12 have corresponding mutually facing and longitudinally offset transverse walls 17, 18, which delimit the opening

16 for access to the emergency button 6 with the cover 12 in the closed position.

[0063] In a configuration, not shown, the two longitudinal portions 14, 15 may be completely separated and independently hinged along a common axis R, to allow selective access to part of the electric devices 7, 8, 9, 10, 11.

[0064] Otherwise, as shown in the figures, the mutually facing and substantially parallel transverse walls 17, 18 are joined by at least one longitudinal lateral rib 19 to define, with the cover 12 in the closed position, a closed or open protective cage 20 for the emergency button 6.

[0065] Advantageously, the lateral rib 19 has a concave upper surface 21, for easier grasp of the emergency button 6 by an operator even with the cover 12 in the closed position.

[0066] The inner lateral surface 22 will also be substantially concave, with a radius of curvature r substantially coincident with the maximum radius r_{MAX} of the emergency button 6, to surround at least part of its periphery, e.g. half of its circumference.

[0067] The push-button station 1 is also equipped with an annular protection member 23, which is integral with the upper wall 4 of the box-like body 2 and is located at the periphery of the emergency button 6. The protection member 23 may have such a peripheral extension as to surround the emergency button 6 it its entirety or in part, like in the illustrated embodiment.

[0068] Furthermore, its maximum height h'" is preferably smaller than the maximum height of the longitudinal rib 19 and is preferably substantially equal to the minimum height thereof, i.e. its height at the lowest point of its upper concave surface 21. Thus, the annular member 23 will at least partially protect the emergency button 6, even with the cover 12 in the open position, without limiting the operation thereof.

[0069] Preferably, the cover 12 will have snap closure means for locking it to the side wall 3 or the upper wall 4 of the box-like body 2.

[0070] For instance, these means may include a pair of hook-like elements 25, 26 integral with corresponding longitudinal portions 14, 15 of the cover 12 and designed to be introduced and snap locked into corresponding slots, referenced 27 and 28 respectively, formed in the box-like body 2. This will prevent both accidental opening of the cover 12 when the push-button station 1 is not used and undesired opening thereof during use of the plant, due to normal vibrations.

[0071] Advantageously, the snap closure means may be of the reversible type to allow the cover 12 to be hinged both to the right and to the left of the emergency button 6. For this purpose, the side wall 3 may have two pairs of holes, generally designated 29, for each of its substantially parallel and transversely opposite longitudinal sides 31, 31', for receiving fastening members, not shown, such as screws or the like, for movable attachment of the cover 12.

[0072] These sides 31, 31' also have two pairs of slots, the left-side slots 27, 28 being only visible in the figures, for selectively receiving and locking the hook-like elements 25, 26 of the cover.

[0073] Finally, the cover 12 and/or the box-like body 2 may comprise hermetic sealing means, such as a seal, not shown, which are stably or removably associated with the free edge 30 of the cover 12 that is designed to abut against the body 2, to protect the devices 7, 8, 9, 10, 11 from accidental contact with liquids, with the cover 12 in the closed position.

[0074] In a second preferred configuration, as shown in Figs. 7 and 8, the cover 12 is adapted to slide along the side wall 3 above the upper wall 4, to move from its open position, as shown in Fig. 7, to its closed position, as shown in Fig. 8, or vice versa.

[0075] Advantageously, the cover 12 may slide along a substantially longitudinal sliding direction X, but it may also slide along a direction transverse to the longitudinal direction L of the box-like body 2, although this is not shown.

[0076] According to a non-illustrated configuration, the cover 12 may consist of two independently sliding portions, e.g. in opposite senses along a longitudinal or transverse sliding direction.

[0077] The electric devices 7, 8, 9, 10, 11 may be of substantially the same type as those of the push-button station 1 of the first configuration as described above. The emergency button 6 is located in a peripheral area of the upper wall 4 and is protected by an annular member 23 that surrounds at least part of its periphery in both open and closed positions of the cover 12, while always ensuring its accessibility.

[0078] Concerning the structure of the box-like body 2, the considerations suggested for the first configuration shall apply.

[0079] The above disclosure clearly shows that the push-button station of the invention fulfills the intended objects and particularly meets the requirement of ensuring constant protection of its most sensitive components against the weather, infiltrations of liquids and negligent use.

[0080] Due to the presence of a movably attached cover 12 and its particular configuration, the most sensitive components will be always protected and the push-button station 1 will have, in its closed position, a particularly attractive appearance, which will make its use preferable in applications exposed to the view, such as in hoistways with glass walls.

[0081] The push-button station of this invention is susceptible to a number of changes and variants, within the inventive concept disclosed in the appended claims. All the details thereof may be replaced by other technically equivalent parts, and the materials may vary depending on different needs, without departure from the scope of the invention.

[0082] While the push-button station has been described with particular reference to the accompanying figures, the numerals are only used for the sake of a

better intelligibility of the invention and shall not be intended to limit the claimed scope in any manner.

Claims

1. A control push button station for lifting and/or transport plants, comprising:

   - a box-like body **(2)** adapted to be associated with a fixed or movable part of a plant to be controlled and housing thereinside a plurality of fixed and/or movable electric contacts for one or more power and/or service circuits of the plant, said box-like body **(2)** having a side wall **(3)** upperly closed by an upper wall **(4);**
   - an emergency button **(6)** located on said upper wall **(4)** of said box-like body **(2)** and electrically connected to at least one first pair of said electric contacts for at least partially opening/closing the power circuit of the plant;
   - at least one electric device **(7, 8, 9, 10)** located on said upper wall **(4)** of said box-like body **(2)** and electrically connected to at least one second pair of said electric contacts for its connection with a corresponding power and/or service circuit and the control thereof;

   characterized by comprising a protection cover **(12)** adapted to be movably associated to said box-like body **(2)** for moving between an opening position wherein said at least one electric device **(7, 8, 9, 10)** is accessible from an operator and a closing position wherein said at least one electric device **(7, 8, 9, 10)** is not accessible from the operator, with said emergency button **(6)** always accessible both in said opening and closing positions.

2. Push button station as claimed in claim 1, **characterized in that** said cover **(12)** is hinged to said box-like body **(2)** fro rotating about a predetermined axis **(R).**

3. Push button station as claimed in claim 2, **characterized in that** said box-like body **(2)** defines at least one longitudinal direction **(L),** said rotation axis **(R)** of said cover **(12)** being substantially parallel and transversally offset, respectively substantially orthogonal, to said longitudinal direction **(L).**

4. Push button station as claimed in one or more of the preceding claims, **characterized in that** said emergency button **(6)** is located in a central area **(13)** of said upper wall **(4),** said cover **(12)** having a central opening **(16)** centerable on said central zone **(13)** of said upper wall **(4)** in correspondence of said emergency button **(6)** for making this latter accessible with said cover **(12)** in said closing position.

5. Push button station as claimed in claim 4, **characterized in that** said emergency button **(6)** projects form said upper wall **(4)** with a predetermined maximum height **(h'),** said cover **(12)** having, at least at said central opening **(16),** an height **(h)** less than said predetermined maximum height **(h')** to allow the handling of said emergency button **(6)** by a user with said cover **(12)** both in said opening position and in said closing position.

6. Push button station as claimed in claim 4 or 5 , **characterized in that** said cover **(12)** comprises two longitudinal portions **(14, 15)** longitudinally offset having respective faced transverse walls **(17, 18)** joined by a lateral web **(19)** to define a protection cage **(20)** for said emergency button **(6)** with said cover **(12)** in said closing position.

7. Push button station as claimed in claim 6, **characterized in that** said lateral web **(19)** has a concave upper surface **(21)** for facilitating the handling of said emergency button **(6)** by a user with said cover **(12)** in said closing position.

8. Push button station as claimed in claim 1, **characterized in that** said box-like body **(2)** defines at least one longitudinal direction **(L),** said cover **(12)** being slidable on said upper wall **(4)** along a direction **(X)** substantially parallel or orthogonal to said at least one longitudinal direction **(L).**

9. Push button station as claimed in one or more of the preceding claims, **characterized by** comprising an annular protection element **(23)** solidal with said upper wall **(4)** and peripherally placed to said emergency button **(6),** for at least partially protecting this latter with said cover **(12)** in said opening position.

10. Push button station as claimed in one or more of the preceding claims, **characterized in that** said cover **(12)** has means **(25, 26, 27, 28)** for its snap locking on said box-like body **(2).**

11. Push button station as claimed in claim 10, **characterized in that** said locking means comprise at least one hook member **(25)** associated to said cover **(12)** and engageable in at least one slot **(27)** formed on each of opposite longitudinal edges **(31, 31')** of said side wall **(3),** said opposite edges **(31, 31')** being provided for the selectively and reversibly anchoring of said rotation axis **(R)** to said side wall **(3).**

12. Push button station as claimed in one or more of the preceding claims, **characterized by** comprising tight sealing means associated to said box-like body **(2)** and/or to said cover **(12)** to protect said at least one electric device **(7, 8, 9, 10)** from liquids when said cover **(12)** is in said closing position.

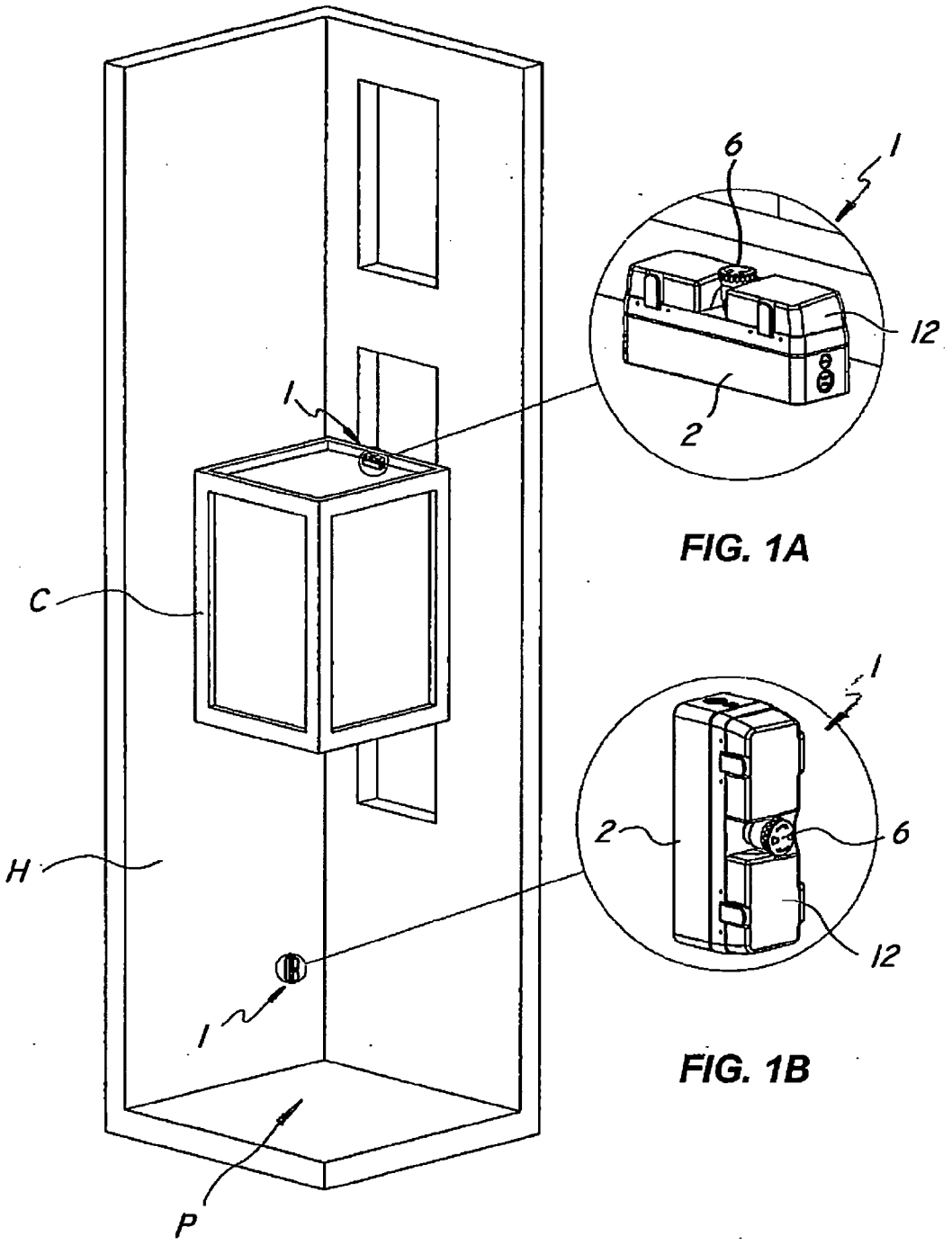

FIG. 1A

FIG. 1B

FIG. 1

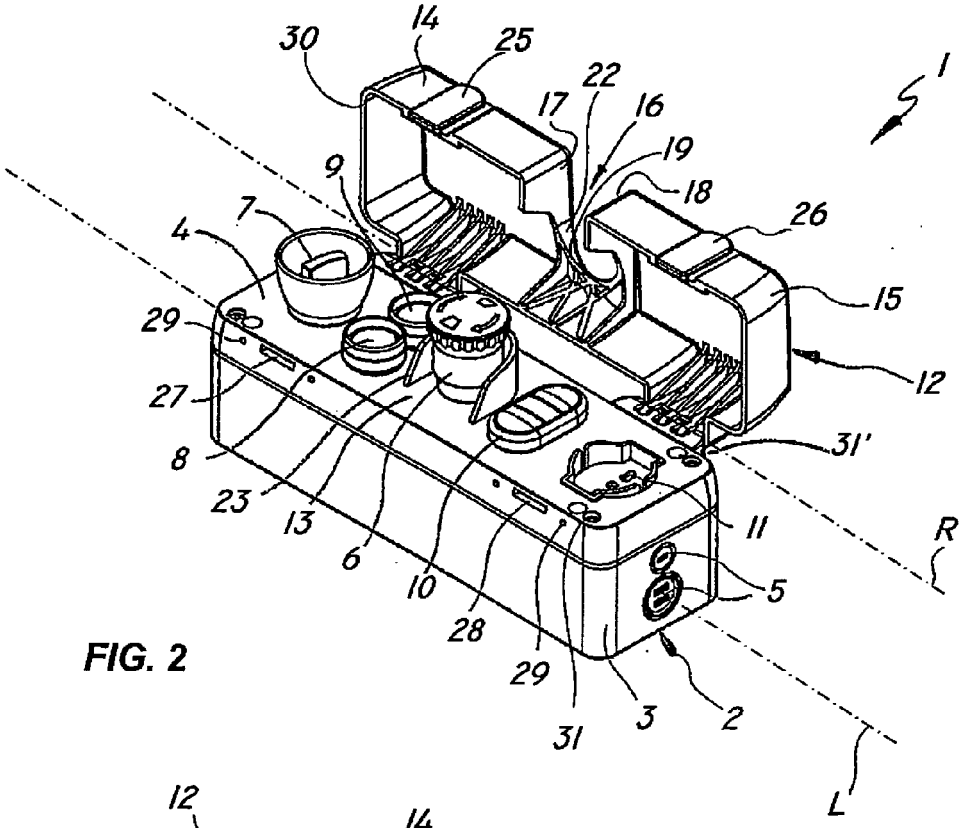
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FIG. 2

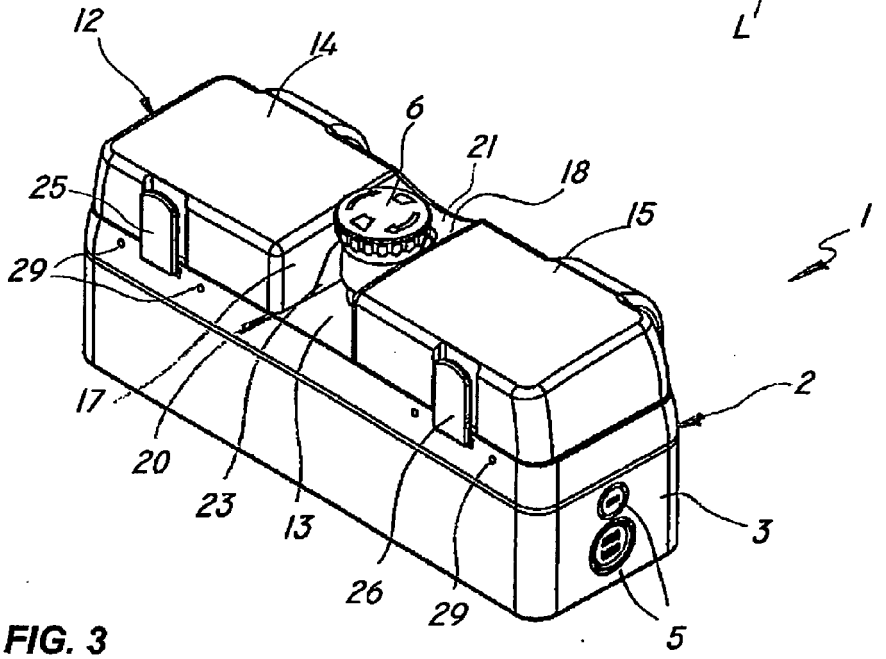
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FIG. 3

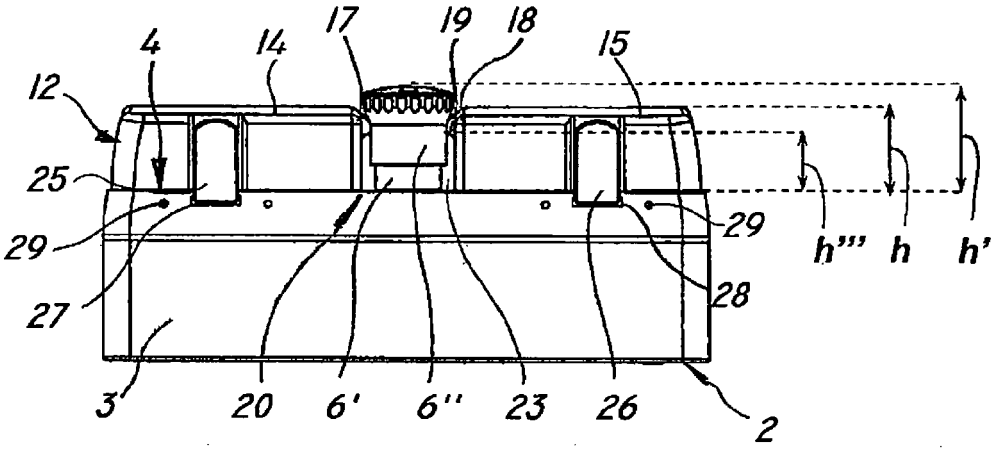

FIG. 4

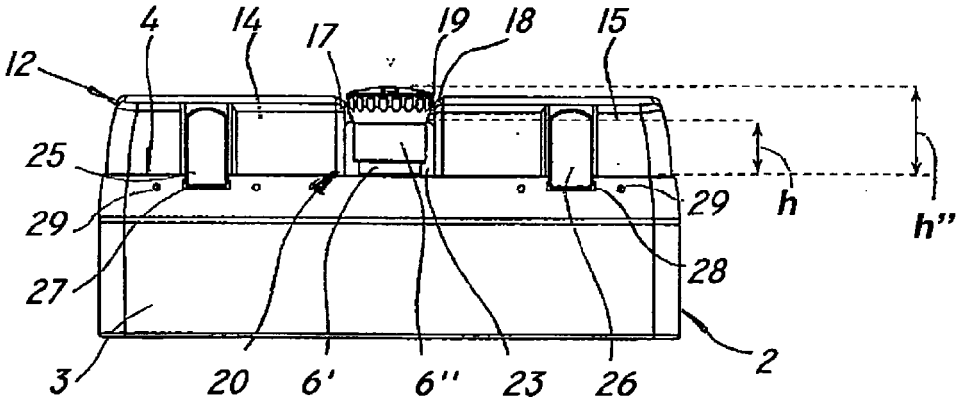

FIG. 5

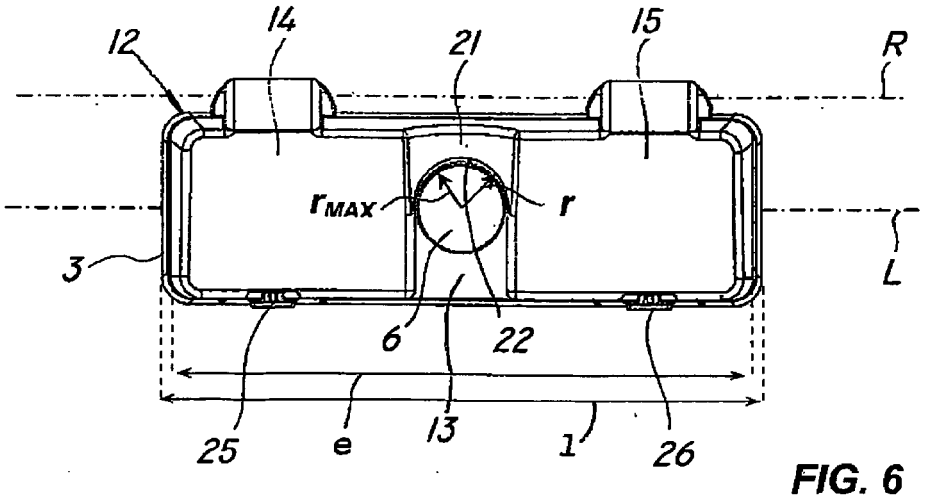

FIG. 6

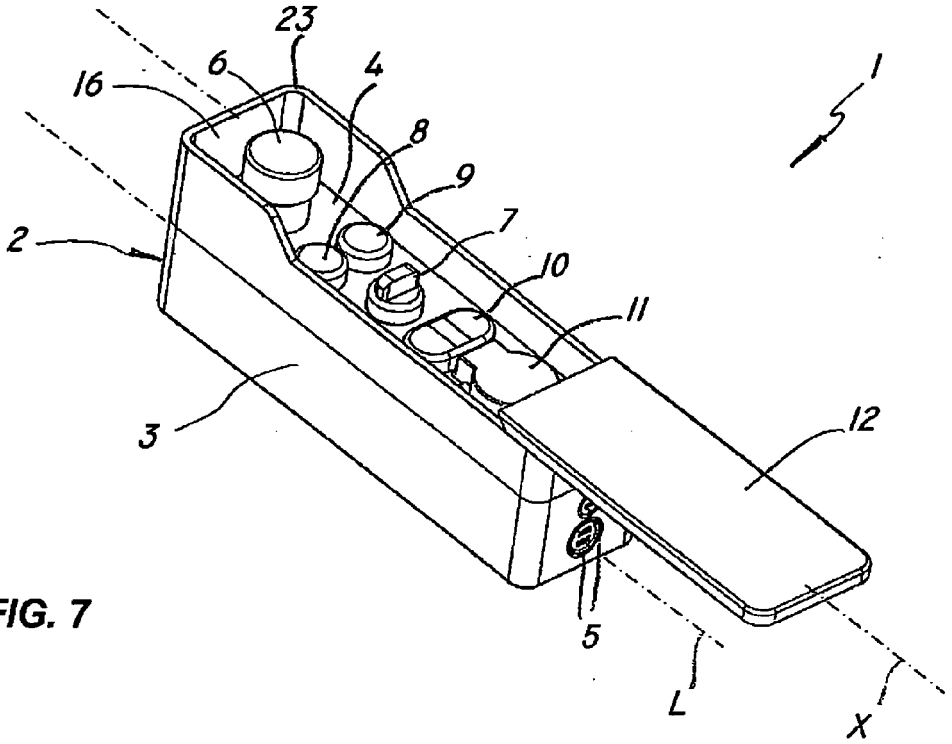

FIG. 7

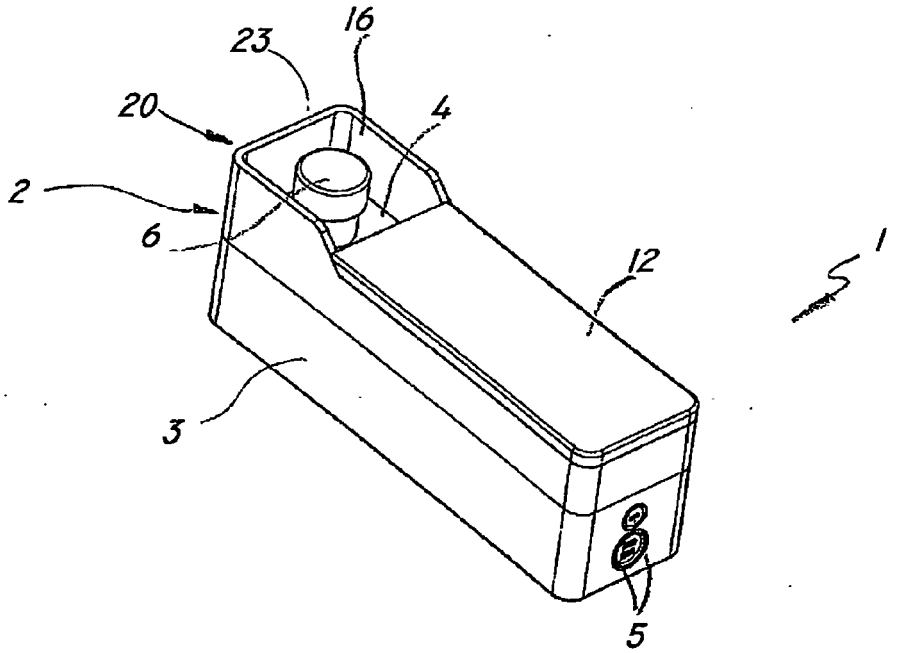

FIG. 8

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 10 01 5771

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 967 477 A1 (INVENTIO AG [CH]) 10 September 2008 (2008-09-10) * abstract * * paragraph [0010] - paragraph [0021] * * figures 1,2 *	1	INV. B66B5/00 G05G1/00
A	US 7 568 557 B2 (ROSSIGNOL ERIC [CH]) 4 August 2009 (2009-08-04) * abstract * * column 4, line 42 - line 63 * * figures 2,3 *	1	
A	US 6 302 240 B1 (SHIH KUEI-TANG [TW]) 16 October 2001 (2001-10-16) * abstract * * column 2, line 24 - line 47 * * figures 1,2 *	1	
A	JP 1 087481 A (MITSUBISHI ELECTRIC CORP) 31 March 1989 (1989-03-31) * abstract * * figure 2 *	1	TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 March 2011	Oosterom, Marcel

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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1

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