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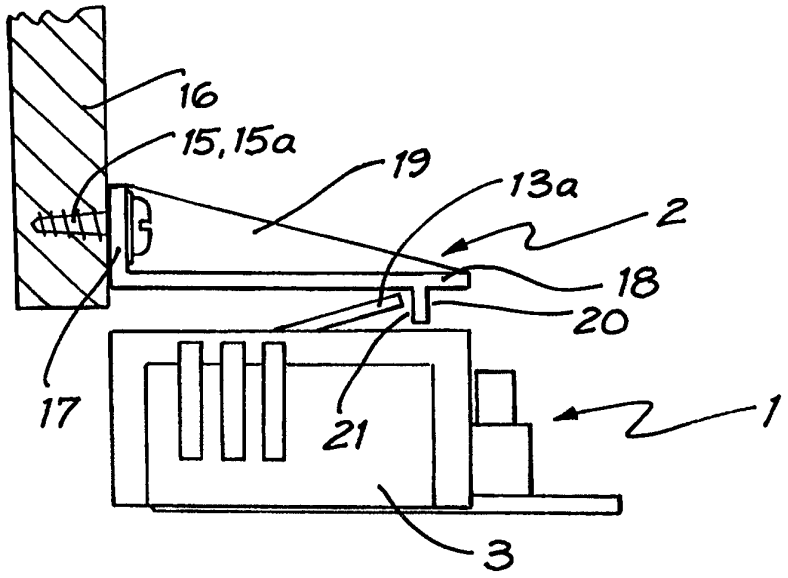
(54) Title: CHILD PROOF REMOTE LOCKING OF BARRIERS SUCH AS DOORS AND THE LIKE

(57) Abstract

An electromagnetic locking assembly for remote locking of a movable barrier (16) such as a cupboard door, window or the like adapted to move relative to a fixed structure, the assembly comprising a locking device (1) secured to the fixed structure which prevents the barrier (16) from moving relative to the fixed structure. The locking device (1) includes an electromagnet (10) and a pivoting clasp (13) which operates under the influence of the electromagnet (10). The locking assembly also includes a catch (2) fixedly attached to the barrier (16) which engages the pivoting clasp (13) to effect locking of the barrier (16), and a power source (11), electrically linked to the electromagnet (10) such that upon energisation of the electromagnet (10) by the power source (11) the clasp (13) pivots away from the catch (2) and towards the electromagnet (10) against a bias (14) to effect unlocking.



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CHILD PROOF REMOTE LOCKING OF BARRIERS SUCH AS DOORS AND THE LIKE

FIELD OF THE INVENTION

The present invention relates to remote locking devices and more particularly relates to an electronic locking assembly which may be mounted on a fixed structure for locking a moveable barrier such as a door, drawer, window or the like and activated remotely thereby allowing a group of such doors, windows or the like to be locked or unlocked upon actuation of a remote power source. The locking assembly depends upon conversion of electrical energy into mechanical energy to effect locking and/or unlocking of the barrier against the fixed structure.

BACKGROUND

Remote locking devices are known in such applications as motor vehicles and on doors and the like. For a variety of different reasons it is considered an advantage to prevent infants, toddlers and children from opening or entering cupboards, particularly kitchen cupboards below the counter top level. Apart from the need for security against unwanted intrusion, there is also a need to protect children especially in the domestic environment from all manner of hazards. Cupboards very often contain noxious goods which can be fatal to children and this has resulted in numerous attempts to produce child proof closures both on goods contained in cupboards and on cupboards and particularly cupboard doors. These devices are typically mechanically operated. One such device utilises a low security, mechanical, keyless lock which can be used at will by an adult but which are inaccessible to a child's fingers or too difficult for children to use due to the absence of the requisite dexterity. These mechanical systems are adequate for their intended purposes but become cumbersome when a plurality of cabinets must be accessed as they must be individually operated.

There are also in existence a variety of locking devices which utilise a combination of electrical energy and associated mechanisms to effect locking and unlocking. One such example is disclosed in patent application number 15247/1985. This document discloses a door operating means incorporating an electric motor connectable to a power supply

and a drive assembly which is operated by that motor to open and close a door. The system described is characterised in including a second electric motor and an automatic clutch which when engaged connects the second electric motor to enable it to operate the drive assembly to open the door. There is also a second power supply and a means responsive to interruption of the first power supply to energise the second electric motor from the second power supply and to engage the clutch. Mechanisms of this type are complicated and expensive and require a multiplicity of component parts.

Another arrangement is disclosed in Australian patent application 81009/1994 disclosing a lock for a door which comprises a tongue pivotal on an axis between a locking position where it engages the striker and an unlocked position where it is clear of the striker. It also includes a pawl pivotal on a second axis between a first position where one end abuts a tongue to hold it in the locking position and a second position where one end is clear of the tongue. There is also included a set of toggles which are hingedly connected end to end between another opposite end of the pawl and another axis. The interconnected ends of the toggles are connected to a solenoid plunger by a link. There is also a stop pin which is moveable between a fail safe position where when the solenoid is deactivated the toggles are biased by a coil spring against the stock pin in a substantially straight configuration and a fail safe position where during energisation of the solenoid the toggles are held to a slightly offset position against the stop pin.

Whilst this kind of lock functions in an acceptable way it is highly complicated and over engineered for the purposes of simple locking of such barriers as cupboard doors, windows and the like.

These devices are useful in the applications to which they are put but are nevertheless expensive and quite complex in their operation. The present invention on the other hand, provides an alternative to the known devices which is relatively inexpensive, easy to install, simple in operation and requiring a minimum of components.

SUMMARY OF THE INVENTION

The present invention overcomes the difficulties associated with individual mechanical locks by providing a system whereby an entire group or array of barriers such as doors, drawers, windows and the like can be simultaneously locked or unlocked from a central console.

It is an object of the invention to provide a simply constructed electronic locking device for use in cupboards, on windows and doors and the like which is easy to install and operate and which is suitable for use in conjunction with a plurality of like devices. It is a further object of the invention to provide a group of cabinets or drawers doors or windows that can be remotely locked and unlocked simultaneously. It is also an object of the present invention to provide an arrangement for locking a group of cabinet doors, draws, windows or the like whereby the simultaneous operation of the arrangement can be achieved from a single console.

The invention will primarily be described with reference to its application to cupboard doors, but this is not to be construed as limiting of the applications to which this device can be put. It may likewise be used for locking a plurality of windows or the like.

Accordingly, there is provided an electromagnetic locking device comprising a pivoting clasp mechanism which engages a catch on a fixed member; a base incorporating a mounting platform which supports an electromagnet and said pivoting clasp. The base also incorporates a cover or housing which contains the electromagnet.

In its broadest form the present invention comprises;
an electromagnetic locking assembly for remote locking of barrier such as a cupboard door, drawer, window or the like, adapted to move relative to a fixed structure;
the assembly comprising;
a locking device secured to the fixed structure and adapted to move between a locked mode in which the barrier is prevented from moving relative to the structure and an unlocked mode in which said barrier is free to move relative to the structure, said locking device including an electromagnet, operatively linked to a pivoting clasp,

a catch fixedly attached to said barrier and including a bearing surface which engages the pivoting clasp when said device is in the locking mode,
the locking assembly including means to enable remote locking and unlocking of said door or window by energisation of the electromagnet from a power source.

In another form the present invention comprises;
an electromagnetic locking device for use with an assembly hereinbefore described enabling locking of a moveable barrier such as cupboard door, window or the like, relative to a fixed structure the device comprising;
an electromagnet contained within a housing comprising a cover and a base;
a pivoting clasp attached to a free end of a member attached to or integral with said base,
terminals on said housing in electrical communication with a power source wherein the pivoting clasp is naturally biased to a locking configuration away from the electromagnet when the electromagnet is isolated from the power source and when the electromagnet is in electrical communication with the power source the pivoting clasp is urged towards the electromagnet under the influence of a magnetic field to effect unlocking.

BRIEF DESCRIPTION OF DRAWINGS

The present invention will now be described in more detail, according to a preferred but non limiting embodiment and with reference to the accompanying illustrations.

Figure 1: shows a side elevation of an electronic cupboard lock, including clasping mechanism and catch, according to a preferred embodiment of the present invention.

Figure 2: shows a cross-sectional view of the device depicted in Figure 1.

Figure 3: shows a top plan elevation of the device depicted in Figures 1 and 2.

Figure 4: shows a front elevation of the catch depicted in Figure 1.

Figure 5: shows a side elevation of a cabinet, partially broken away to reveal an electronic locking device and console.

Figure 6: shows a side elevation, partially broken away showing a cupboard and location of components of the present invention.

Figure 1 shows a locking device 1 and catch 2 which together form part of an overall remote controlled locking assembly. Locking device 1 may be used in the locking of a barrier such as a window or door which move relative to a fixed structure (not shown) to which device 1 is fixedly attached. Thus, locking device 1 is according to two embodiments fixedly attached to either a fixed member such as a cupboard structure or a fixed window surround. The invention will for convenience primarily be described with reference to its application to the locking of cupboard doors. Figure 2 shows a cross section of locking device 1 of figure 1. Device 1 comprises a housing 3 including a base member 4 which is connected to the fixed structure 5 by means of fasteners 6, 7 which penetrate openings 8 and 9 respectively (see figure 3). Inside housing 3 and connected to base member 4 is an electromagnet 10 operably linked to a remote power source 11 (see figure 6). Pivotally attached at or near free end 12 of base member 4 is pivoting clasp 13 which is naturally biased away from electromagnet 10 by means of leaf spring 14 which is connected to base member 4. As shown in figure 1 catch 2 is attached via screw anchor 10 to a moveable barrier such as door 16. Catch 2 comprises a generally L shaped member comprising short leg 17 and long leg 18 strengthened by gusset 19. Downwardly depending from leg 18 is tab 20 having a surface 21 against which free end 13a of pivoting clasp 13 bears when the clasp is naturally biased to the locking mode thereby preventing opening of the door. It will be appreciated by those skilled in the art that catch 2 may be configured in a variety of shapes provided it has a surface, protrusion or the like which opposes pivoting clasp 13a to provide interference against movement of barrier 16.

As can be seen in figure 2 adjacent housing 3 or integral therewith are contacts 22 and 23 which receive and anchor electrical wires. Contact 23 connects directly via wires (not shown) to remote power source 11 (see fig 6) and contact 22 is in communication with electromagnet 5.

Figure 2a shows an end view of housing 3 showing free end of pivoting clasp 13a extending beyond the top surface 24. Housing 3 includes a recess 25 into which pivoting clasp 13 locates upon actuation of electromagnet 10.

Figure 3 shows a plan view of housing 3 with recess 25. Extending from the periphery of housing 3 is base member 4 including openings 8 and 9 which receive fasteners 6, 7 which may be screws to anchor the device to the fixed structure 5. Housing 3 incorporates contacts 22 and 23 which act as junctions which receive wires from the power source 11.

Referring to figure 4 there is shown a front elevation of catch 2. Catch 2 includes openings 50 and 51 which receives fasteners 15 and 15a (see figure 1). Catch 2 has legs 17 and 18 and depending downwardly from leg 18 is tab 20.

The ridged base 4 includes upstanding free end 12 (as shown in Figure 5). The top surface 26 of free end 12 includes a notch 27 for supporting the clasp 13. At one end, the side edges of the clasp 13 are formed with indents 28 and 28a to form a neck 29. Neck 29 fits within and pivots about the notch (27) formed in free end 12 of base 4.

Electromagnet coil 10 which is affixed to the base 4, when activated generates a field which attracts the pivoting clasp 13. This retraction or magnetism of the clasp 13 locates the clasp within the recess 25 and allows the tab 20 of the catch 2 to move freely past. When retracted by the action of the electromagnet coil 10, the clasp 13 works against the resilient bias provided by leaf spring 14. When the clasp 13 is released by the electromagnet coil 10 upon de energisation or isolation from power source 11, the leaf spring 14 acts to return the clasp 13 to its original, resting position (as shown in Figure 2) proud of recess 25.

As can be seen in figure 3 contacts on the exterior of the terminals 22 and 23 allows the easy attachment of electrical wires to the electromagnet coil 10 which itself is attached to contact 30 located within the housing 3. While screw or pressure contacts have been shown in the examples depicted in Figures 1-3 it would be understood that any of a wide variety of terminal styles would be suitable.

As shown in Figure 3, the clasp 13 resides within the confines of the opening 25 when the electromagnet 10 is actuated. The free end 13a of the clasp 13 is bent upward about a transverse fold line 31 (as shown in figure 5) primarily to increase the clearance between the end 13a of the clasp 13 and the upper surface of housing. Also, visible in Figure 3 are the two holes 8, 9 formed in the base 4. The device may be affixed to the interior of a cupboard with fasteners 6, 7 passing through the two holes 8, 9. The mounting holes are located at an end of the base 4 opposite the clasp support end 12.

As shown in Figure 6, a cupboard consists of one or more doors 40 or drawers 41 and may include and interior shelf 42 and a side panel 43. The locking device 1 may be conveniently located on the upper surface of the internal shelf 42. A through hole 44 allows the connecting wires 45 to pass conveniently and inconspicuously over the lower surface of the internal shelf 42. The catch 2 is shown mounted adjacent one edge of a cabinet door 40 in this instance, the edge opposite the hinged edge. Catch 2 is mounted just above the location of the locking device 1. So long as the clasp 13 is maintained in an interfering position by the resilient bias 14, the door cannot be opened. When an electrical current is applied to the electromagnet coil 10 in the clasping mechanism, clasp 13 retracts allowing the tab 20 to pass and the door to open.

One of the advantages of the present invention is that any number of electronic clasp mechanisms can be ganged and operated simultaneously by a central console 11 as shown in Figure 6. A console 11 comprises a power supply such as batteries or a mains operated transformer (not shown), an on-off switch 46 and an indicator light 47. The console 11 can be mounted within the cabinet itself, may be mounted exterior to the cabinet in or on a wall or provided as a table top unit. Regardless of where the console 11 is mounted, the on-off switch 46 must be accessible to the user when the cabinet is closed and the indicator 47 must be conveniently visible. The indicator light 47 indicates when the device is active or inactive. In one embodiment, the on-off switch 46 is operated to allow current to pass both to the indicator light 47 and the individual electronic clasps 13. This has the effect of both illuminating the indicator 47 and activating or retracting the clasp 13. The indicator light 47 thus serves to alert the user that the cabinets are no longer child proof and must be supervised. When the current is

interrupted, the indicator 47 goes off and the clasp 13 return to their rest positions. In this rest position, a clasp prevents a door or drawer from being opened and consumes no power. An opened door or drawer when closed over an inactive clasp will not be able to be opened until the circuit is reopened by the switch 46.

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While the present invention has be described with reference to particular construction details, these should be understood as to having been provided by way of example only and not as limitations to the scope or spirit of the invention.

THE CLAIMS:

1. An electromagnetic locking assembly for remote locking of a moveable barrier such as a cupboard door, window or the like, adapted to move relative to a fixed structure;

the assembly comprising;

a locking device secured to the fixed structure proximate said barrier and having a locking mode in which the barrier is prevented from moving relative to the fixed structure and an unlocked mode in which the barrier is free to move relative to the fixed structure, said locking device including an electromagnet, and a pivoting clasp which operates under the influence of said electromagnet,

a catch fixedly attached to said barrier and including a bearing surface which engages the pivoting clasp when said device is in the locking mode to effect locking of the barrier, the locking assembly including a power source electrically linked to the electromagnet such that upon energisation of the electromagnet by the power source the clasp pivots away from the catch and towards the electromagnet against a bias to effect unlocking so that the barrier is free to move relative to the fixed structure.

2. An assembly according to claim 1 wherein a free end of said pivoting clasp opposes the bearing surface of the catch to effect said locking by interference.

3. An assembly according to claim 2 wherein the pivoting clasp is naturally biased towards the locked configuration when the power source is isolated from the electromagnet.

4. An assembly according to claim 3 wherein the bias comprises a leaf spring.

5. An assembly according to claim 4 wherein said locking device further comprises a housing in which is located said electromagnet, said housing including apertures to enable fastening of the locking device to said fixed structure.

6. An assembly according to claim 5 wherein the housing includes a base member which terminates at a free end inside the housing and to which is pivotally connected said clasp.

7. An assembly according to claim 6 wherein the leaf spring is attached to said free end of said base member.

8. An assembly according to claim 7 wherein the catch opposes the housing when the barrier is closed to enable pivoting of said pivoting clasp between the locking and unlocked mode.

9. An assembly according to claim 8 wherein the catch comprises a generally L shaped member having a short leg and a long leg, said short leg being fixed to said barrier, said long leg including a pawl including the surface against which the free end of the pivoting clasp bears to effect locking by interference.

10. An assembly according to claim 9 wherein the electromagnet includes a coil and is fixed to said base member.

11. An assembly according to claim 10 further comprising on or adjacent the housing, electrical contacts which receive electrical wires from the power source at least one of said contacts being in electrical communication with the electromagnet.

12. An assembly according to claim 11 wherein the electrical power to the electromagnet is provided by batteries.

13. An assembly according to claim 12 wherein the batteries are contained in a remote console which includes an isolation switch which isolates the electromagnet from the power source and an indicator light.

14. An assembly according to claim 13 wherein there are multiple locking devices connected in series or parallel and actuated by said switch to effect locking or unlocking.

15. An assembly according to claim 14 wherein the central console is located remote from the locking assembly but exterior of the locked space.

16. An electromagnetic locking device for use with an assembly hereinbefore described enabling locking of a moveable barrier such as cupboard door, window or the like, relative to a fixed structure the device comprising;

an electromagnet contained within a housing comprising a cover and a base;

a pivoting clasp attached to a free end of a member attached to or integral with said base,

terminals on said housing in electrical communication with a power source wherein the pivoting clasp is naturally biased to a locking configuration away from the electromagnet when the electromagnet is isolated from the power source and when the electromagnet is

in electrical communication with the power source the pivoting clasp is urged towards the electromagnet under the influence of a magnetic field to effect unlocking.

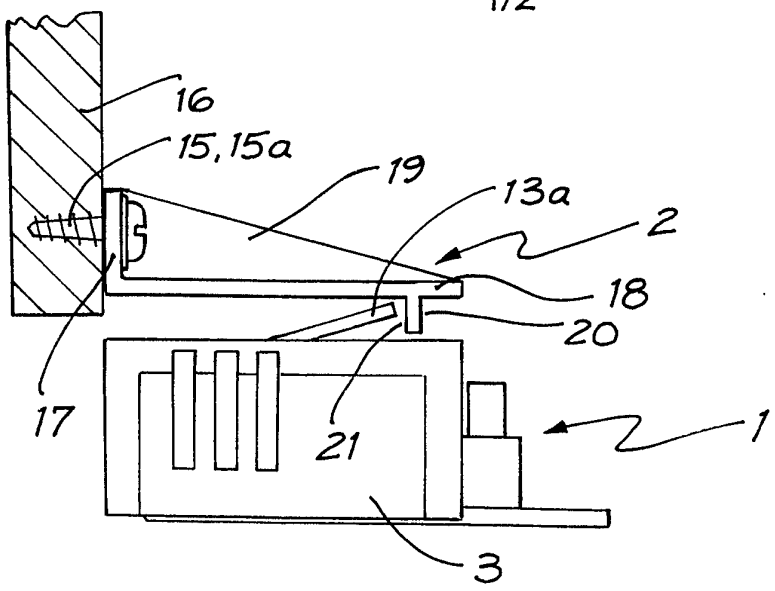


FIG. 1

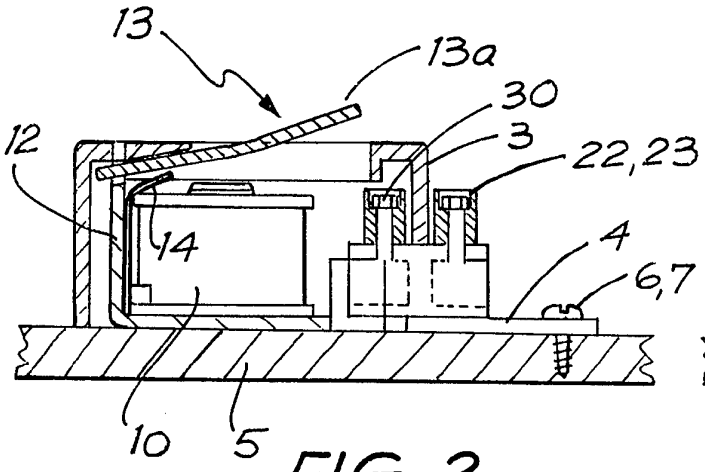


FIG. 2

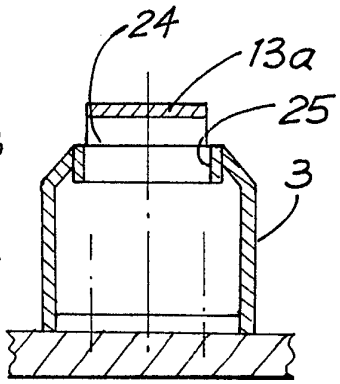


FIG. 2a

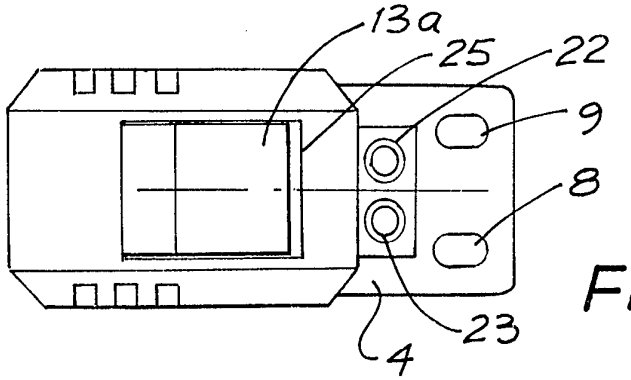


FIG. 3

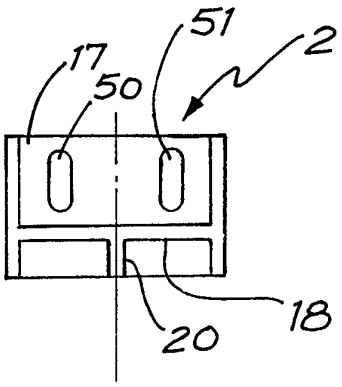


FIG. 4

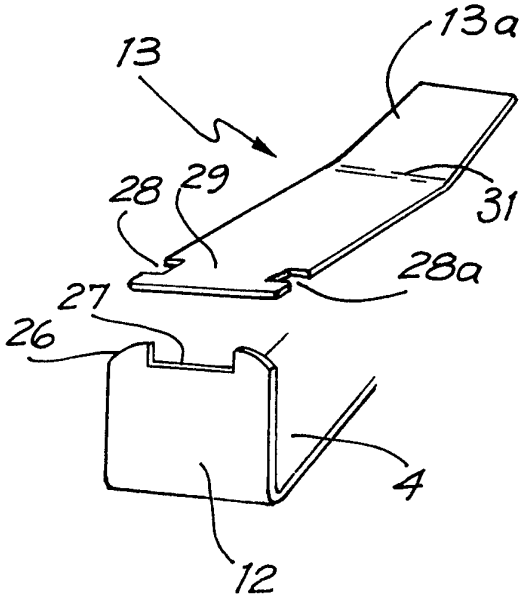
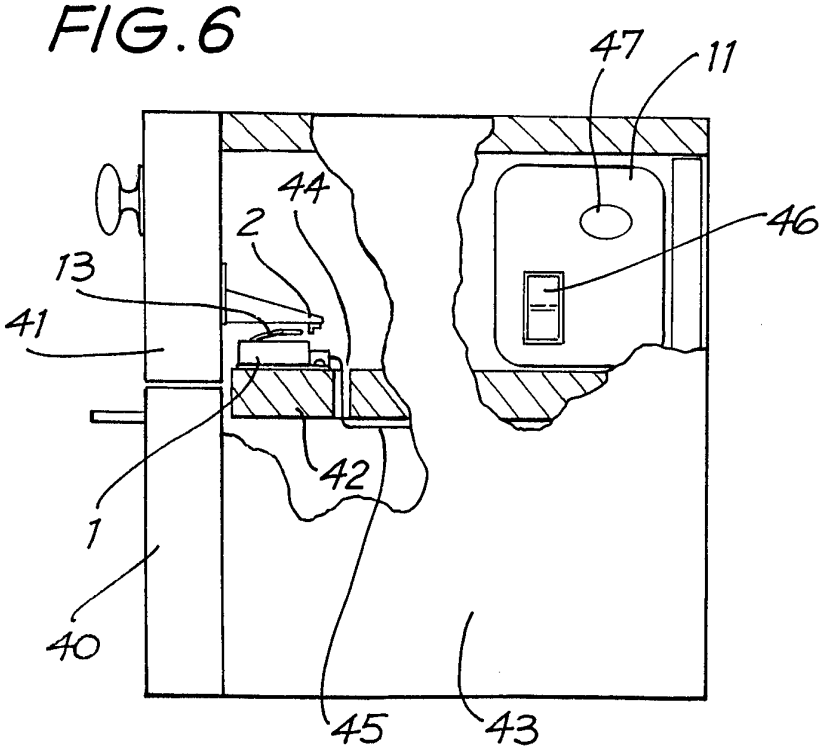


FIG. 5

FIG. 6



INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 96/00416

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[6]: E05B 47/02

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC E05B 47/02, 63/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	GB 1038624 A (DUNFORD FIRE PROTECTION SERVICES LIMITED) 10 August 1966	
X	entire document	1-12,16
A		13
	US 2325225 A (BURKE) 27 July 1943	
X	column 1, line 40 to column 2, line 35	1-12,16
	GB 1441450 A (WILMOT-BREEDEN LIMITED) 30 June 1976	
X	Page 1, line 95 - page 2, line 75	1-12, 16

[X] Further documents are listed in the continuation of Box C

[X] See patent family annex

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Date of the actual completion of the international search	Date of mailing of the international search report
3 October 1996	24 Oct 1996
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INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 96/00416

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 4101744 A (ENORM-SCHMIDT BESCHLAGE GmbH) 23 July 1992 Figures 1-10	1-16
Y	DE 4316274 C (HALLOFORM GmbH) 10 November 1994 Figures 1-5	1-16
Y	EP 281340 A (AUTOMATIC ELECTROLOCK, INC.) 7 September 1988 entire document	1-16
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X	Derwent Abstract Accession No. 87-141601/20, SU 1258976 A (BUTENKO) 23 September 1986 abstract	1-12,16
A	EP 394157 A (BUROFORM SA) 24 October 1990 Figure 1	14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.
PCT/AU 96/00416

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
GB	1441450				
DE	4101744	CN	1063738		
DE	4316274				
EP	281340	US	4819379		
GB	2223058	US	5042857	GB	8824807
EP	394157	FR	2645896		

END OF ANNEX