



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 178 167 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.02.2002 Bulletin 2002/06

(51) Int Cl.7: **E05B 49/00, E05B 47/00**

(21) Application number: **00120977.4**

(22) Date of filing: **27.09.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(71) Applicant: **U-Code, Inc.**
Torrance, CA 90505 (US)

(72) Inventor: **Gartner, Klaus W.**
Torrance, CA 90505 (US)

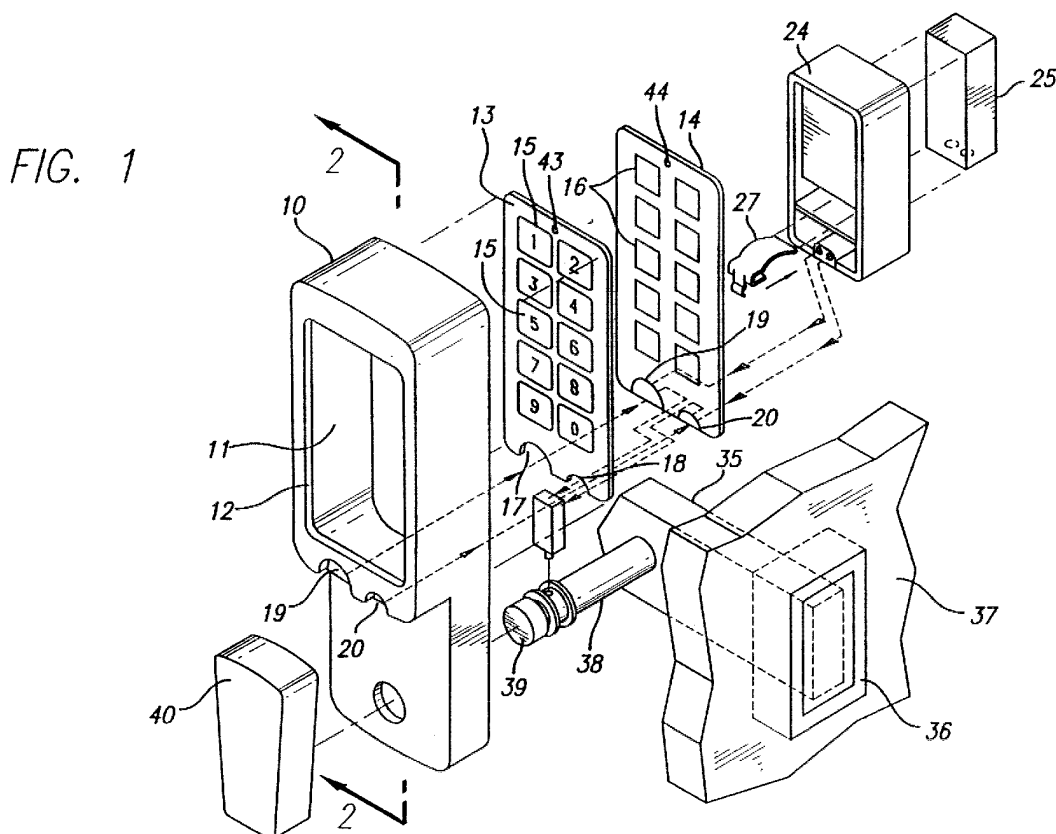
(30) Priority: **04.08.2000 US 635119**

(74) Representative: **Petraz, Gilberto Luigi et al**
GLP S.r.l. Piazzale Cavedalis 6/2
33100 Udine (IT)

(54) **Combination lock with terminals for operation with an additional battery**

(57) A electronic combination lock includes a rotatable shaft which interacts with a bolt to permit locking and release. A solenoid armature shaft interacts with a rotatable shaft to inhibit or permit rotation of the shaft. A first battery is located in a housing for operating the

solenoid. Terminals are provided in the front of the housing for the lock to permit connection with a second battery to provide power to the lock as necessary. A pistol grip permits rotation of the shaft when the solenoid armature is free of the shaft.



EP 1 178 167 A1

Description

RELATED APPLICATION

[0001] This application relates to the european patent application of the present Applicant being filed coterminously with the present application. Such application is entitled "ELECTROMECHANICAL LOCK WITH DIFFERENT SEQUENCES OF OPERATION IN RELATION TO KEYING IN DIFFERENT ACCESS CODES", European Patent Application No.

[0002] The contents of that application are incorporated by reference herein.

BACKGROUND OF THE INVENTION

[0003] This invention relates to a combination lock, which is electrically or battery operable. Such locks can be for use on safes or on doors. A problem that exists with different battery and electrically operated combination locks is often caused by low battery power or a power failure. Such low power can cause difficulty in operating a electrical components such as a solenoid often associated with such a lock.

[0004] This invention is directed to providing an improved mechanism for operating an electrical or battery operated combination lock in a manner which makes it less dependent on the conventional electrical or battery powering of the lock. The invention is directed to minimize the difficulties with known electrical and battery operated combination locks.

SUMMARY OF THE INVENTION

[0005] It is an object of the present invention to disclose and provide an electrical or battery powered combination lock mechanism for secure use to ensure the ability to operate in the event of power failures or low battery conditions associated with the lock.

[0006] This is achieved by carrying out the features disclosed in the main claims. The dependent claims outline preferred forms of embodiment of the invention.

[0007] Generally stated, the present invention includes a lock, which includes a bolt-locking mechanism operable between a bolt-locking and a bolt-release condition through entry of a lock-opening combination by digital input of a predetermined code to operate the locking mechanism. There is also a rotatable shaft with a formation to interact with a solenoid armature such that interaction with the armature prevents rotation of the shaft. When the armature is released, the shaft is rotatable. Rotation of the shaft permits a bolt to move between the locking position and the release condition.

[0008] There is provided a first battery for operating the lock-activating mechanism and, in turn, the armature-activating mechanism. Terminals are provided in a front face of the housing for the lock, the terminals are for connection with conductors such that a supplemental

backup battery or the like can be provided to connect with the lock-activating mechanism and, operate the armature-activating mechanism.

[0009] A snap-in battery has protruding terminals from one face to snap into engagement with two terminals provided on the front face of the lock. The terminals are mounted at a location ahead and above of a pistol grip mechanism for rotating the shaft when the armature-activating mechanism is released from the formation on the periphery of the shaft.

[0010] A main battery is located in a battery housing within the lock mechanism which is located and accessible at the rear of a keypad for the lock.

[0011] The invention is further described with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

FIG. 1 is a perspective exploded view showing an electrical combination lock with a front housing keypad input touch-sensitive panel housing for a battery, and a battery for normal location. There is also shown a solenoid armature and rotatable shaft for operation with the bolt. The bolt-receiving area and jam is also shown. This lock would be useful for a safe system or other lockable system.

FIG. 2 is a cross-sectional side view of the lock mechanism.

FIG. 3 is a perspective view of a lock mechanism showing the snap-in battery.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] A lock housing 10 includes a receptacle area 11 with a window portion 12, for receiving a keypad face 13 with a series of numerals and/or alphabetic characters that can provide for the different combination for operating an electronic lock. Behind the keyboard input face 13, there is a touch-sensitive element 14, which responds to pressure on the keypad 13. On the keypad, there are cells 15, which correspond to cells 16 on the touch-sensitive pad 14. On the keypad 13, there are two cutouts, 17 and 18. Cutout 17 is larger than cutout 18. Electrically-conductive corresponding components 19 and 20 are provided on the touch-sensitive pad 14. In this manner, appropriate terminals 21 and 22 from battery 23 can be manually applied to touch the terminals 19 and 20, as necessary.

[0014] In the sub-housing or battery housing 24, there is located a battery 25, which can be rechargeable, if necessary. The terminals 26 from the battery 25 connect with a spring element 27 that is connected with a cable 28 to the touch-pad 14. The terminals 19 and 20 connect with the touch-pad, as shown. The conductors from the

touch-pad 14 are shown through the wire 29.

[0015] The wire 29 is connected to the electronic system and mechanism 30 of the armature-activating mechanism 31 for activating the armature 32 to move upwardly and downwardly to engage a cam surface 33 of a rotatable shaft 34. A spring 35 can act to cause the armature 32 to be urged downwardly and/or alternatively, the shaft 32 can be urged downwardly under gravity action. The shaft 34 engages a bolt 35 and then that engages a receptacle slot 36 in a jam 37, which is figuratively shown in FIG. 1. As illustrated, the armature-engaging protruding element engages an aperture 38 in the cam of the rotatable shaft.

[0016] In other situations, the armature may engage a different kind of interactive element, for instance a flat face on the cam. The one end of the armature is connected with a cap element 39 for engaging a pistol grip 40. A suitable receptacle slot 41 is provided, and a screw or stud connector 42 allows for the secure location of the pistol grip with a stud 39. When the end of the armature 32 does not engage the aperture 38, the shaft 34 can be rotated, which, in turn, causes the bolt 35 to move between the released and unreleased positions. Ideally, when the armature 32 engages the aperture 38, the bolt is in the engaged position in the receptacle 36 in the jam 37. Movement of the end of the armature 32 from the aperture 38 permits the rotation of the shaft and removal of the bolt from the receiving slot 36.

[0017] The keypad 13 includes an aperture 43 for receiving an LED 44, which is connected electrically with the touch-pad 14 so that the operation electrically of the system can be indicated by the LED. The LED and electronics can be programmed so that it flashes in any fashion selectively in any one or more of the conditions of when the system is operable, non-operable, activated to permit unlocking, activated to permit locking, battery flat, or battery operational.

[0018] There are many other examples of the invention, each differing from the other in matters of detail only.

[0019] For instance, although the invention is described with reference to an armature that moves physically downwardly to interact with the shaft, other configurations may have the armature move sideways to engage the shaft. There could also be other situations of armature and shaft engagement so that the bolt can be operational by a hand mechanism different from the pistol grip. Suitable electronics can be provided for operating the bolt when the armature is released from/into engagement with the shaft.

[0020] A feature of the invention is the provision externally of terminal ports to permit a backup battery to be used with the lock mechanism in the event that the in-house battery or other electrical supply to the lock mechanism fails or is lower than required.

[0021] The invention is to be determined in terms of the following claims.

Claims

1. A combination lock comprising

a housing;
a bolt movable relative to the housing;
a bolt-locking mechanism operable between a bolt-locking and a bolt-release condition through entry of a lock-opening combination by digital input of a predetermined code to electronically operate the lock mechanism having:

a rotatable shaft extending for engagement with the bolt, rotation of the shaft acting to move the bolt inwardly and outwardly between a locking and bolt-released condition:

a formation in the periphery of the shaft for engaging an armature of an electronically operable solenoid whereby, when the formation engages an armature of the solenoid, it is prevented from rotating, and terminals for receiving terminals from a back-up battery manually connected with the terminals to operate its solenoid.

2. A lock as claimed in claim 1 wherein the solenoid is mounted relative to the rotational shaft such that the armature moves upwardly and downwardly into engagement with the rotatable shaft, and wherein selectively the downward movement is under the action of at least one of a spring and/or gravity.

3. A lock as claimed in claim 2 wherein a solenoid-activating mechanism is mounted in relation to the armature for urging the armature movement selectively upwardly and/or downwardly in response to signals from an armature activating mechanism, the armature activating mechanism being operated in response to digital input of a predetermined code to operate the locking mechanism and, in turn, the armature-activating mechanism.

4. A lock as claimed in claim 1 wherein the housing is for mounting a front panel including a keypad for digital input, a touch-sensitive panel related to a keypad input, the touch-sensitive panel being connected with a lock-operating mechanism, and a battery housing, the battery being housed for operational relationship with the lock-activating mechanism, and the armature-activating mechanism, and including means for manually rotating the shaft when the armature of the solenoid-activating mechanism does not inhibit rotation of the shaft.

5. A lock as claimed in claim 4 wherein the battery is mounted on the lock in the battery housing, such battery housing being accessed from the rear of the lock mechanism relative to the keypad.
6. A lock as claimed in claim 5 wherein the terminals for connection with the back-up battery manually brought into engagement with the lock from a position outside the housing.
7. A lock as claimed in claim 6 wherein there are a pair of terminals, the terminals being spaced and located external to and on the housing face below the keypad.
8. A lock as claimed in claim 7 wherein the bolt-activating means includes a pistol handle rotatable substantially parallel to the face of the keypad, the pistol handle being mounted relative to the housing such that it does not extend beyond the terminals for a manually applied battery.
9. An electronically activated combination lock having a housing, a bolt movable relative to the housing, a bolt-locking mechanism operable between a bolt-locking and a bolt-release condition through entry of a lock-opening combination by digital input of a predetermined code to operate the lock mechanism comprising:
 - a rotatable shaft extending for engagement with the bolt, rotation of the shaft acting to move the bolt inwardly and outwardly between a locking and bolt-released condition;
 - a formation in the periphery of the shaft for engaging an armature of an electronically operable solenoid whereby, when the formation engages an armature of the solenoid, it is prevented from rotating;
 - the solenoid being mounted relative to the rotational shaft such that the armature moves upwardly and downwardly into engagement with the rotatable shaft, and wherein selectively the downward movement is under the action of at least one of a spring and/or gravity;
 - a solenoid-activating mechanism is mounted in relation to the armature for urging the armature movement selectively upwardly and/or downwardly in response to signals from the armature activating mechanism, the armature activating mechanism being operated in response to digital input of a predetermined code to operate the locking mechanism and, in turn, the armature-activating mechanism; and
 - a hand operating device for rotating the shaft, the hand operated device being adjacent a keypad for digital input of a code,
10. A lock as claimed in claim 9 wherein the battery is mounted on the lock in a housing accessed from the rear of the lock mechanism relative to the keypad, and terminals for connection with a back-up battery manually brought into engagement with the lock.
11. A lock as claimed in claim 10 including a housing for mounting a front panel including the keypad for digital input, a touch-sensitive panel related to a keypad input, the touch-sensitive panel being connected with a lock-operating mechanism, and a housing for a battery, the battery housed for operational relationship with the lock-activating mechanism and, in turn, the armature-activating mechanism, and including means for manually rotating the shaft when the armature of the solenoid-activating mechanism does not inhibit rotation of the shaft.
12. A lock as claimed in claim 11 wherein there are a pair of terminals, the terminals being spaced and located on the housing below the keypad.

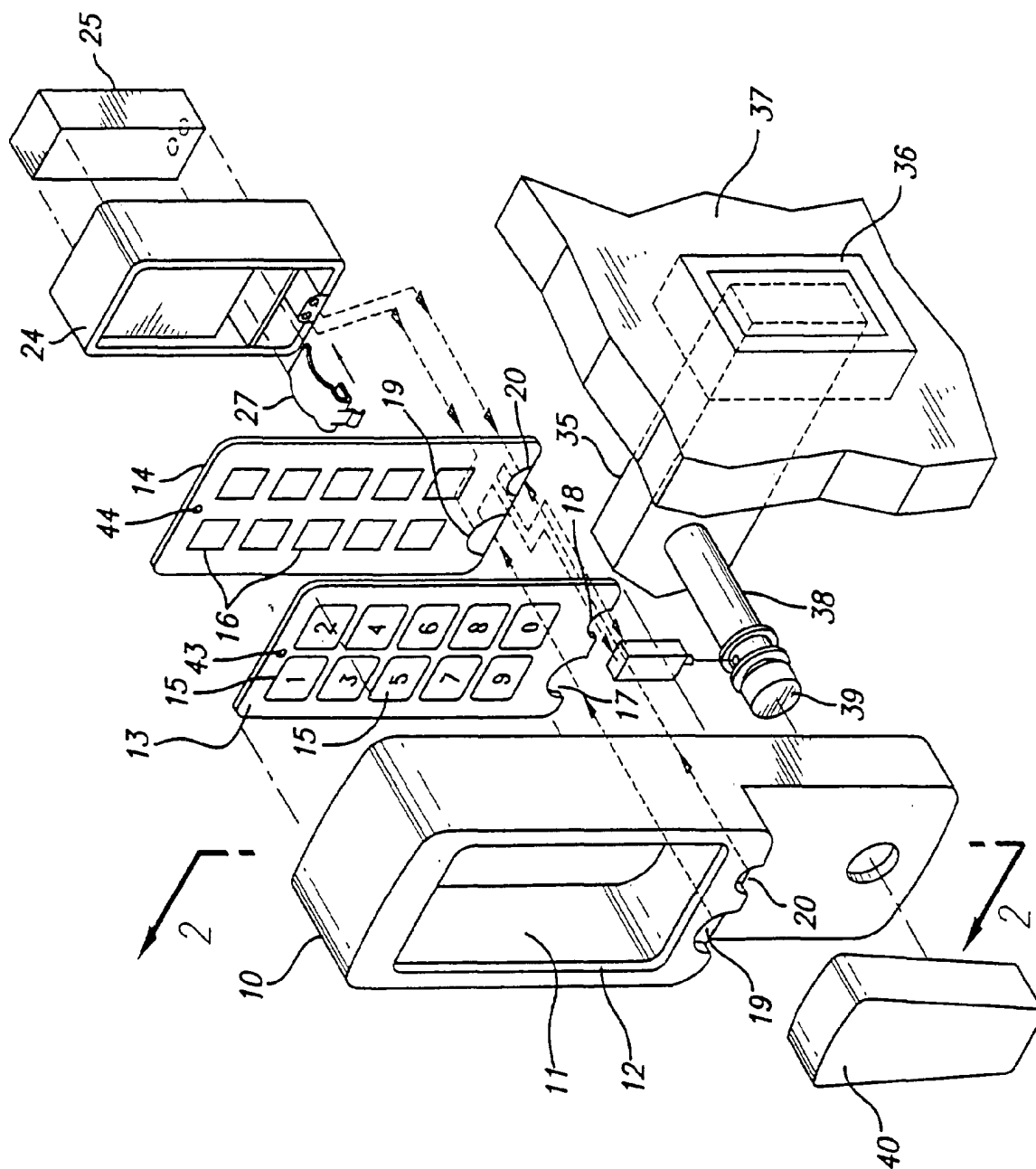


FIG. 1

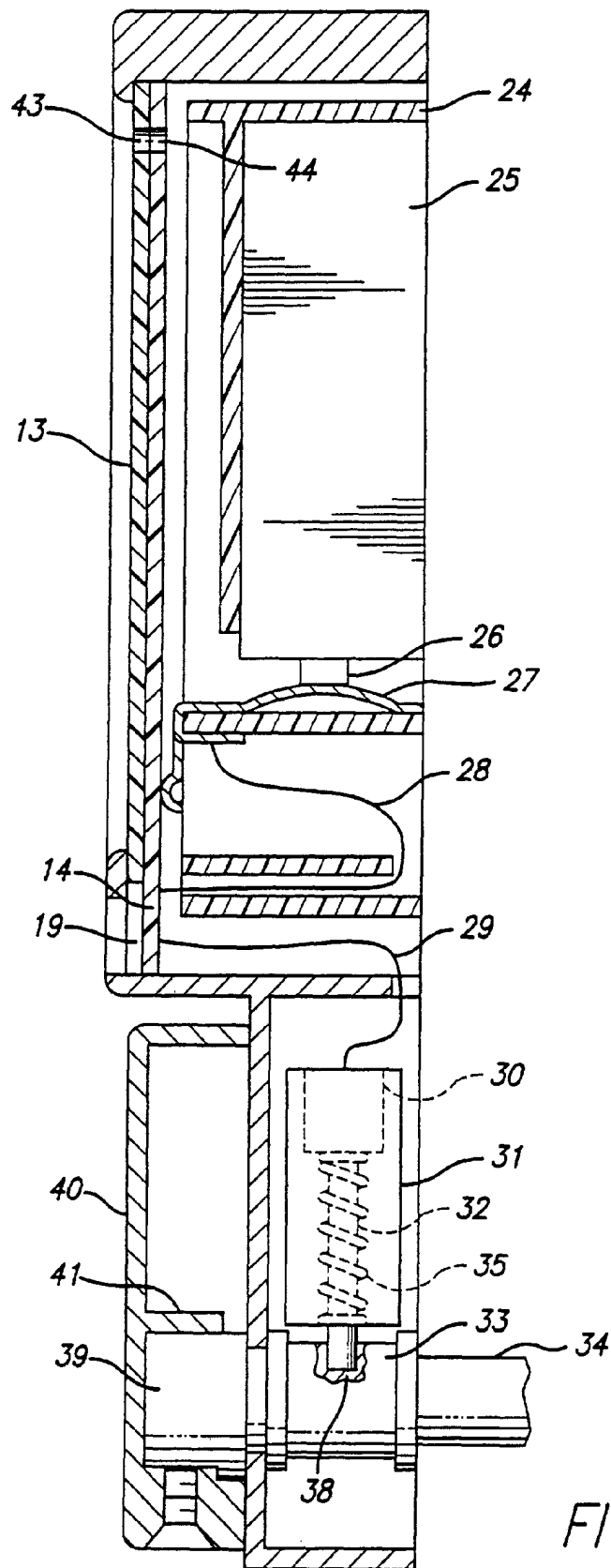


FIG. 2

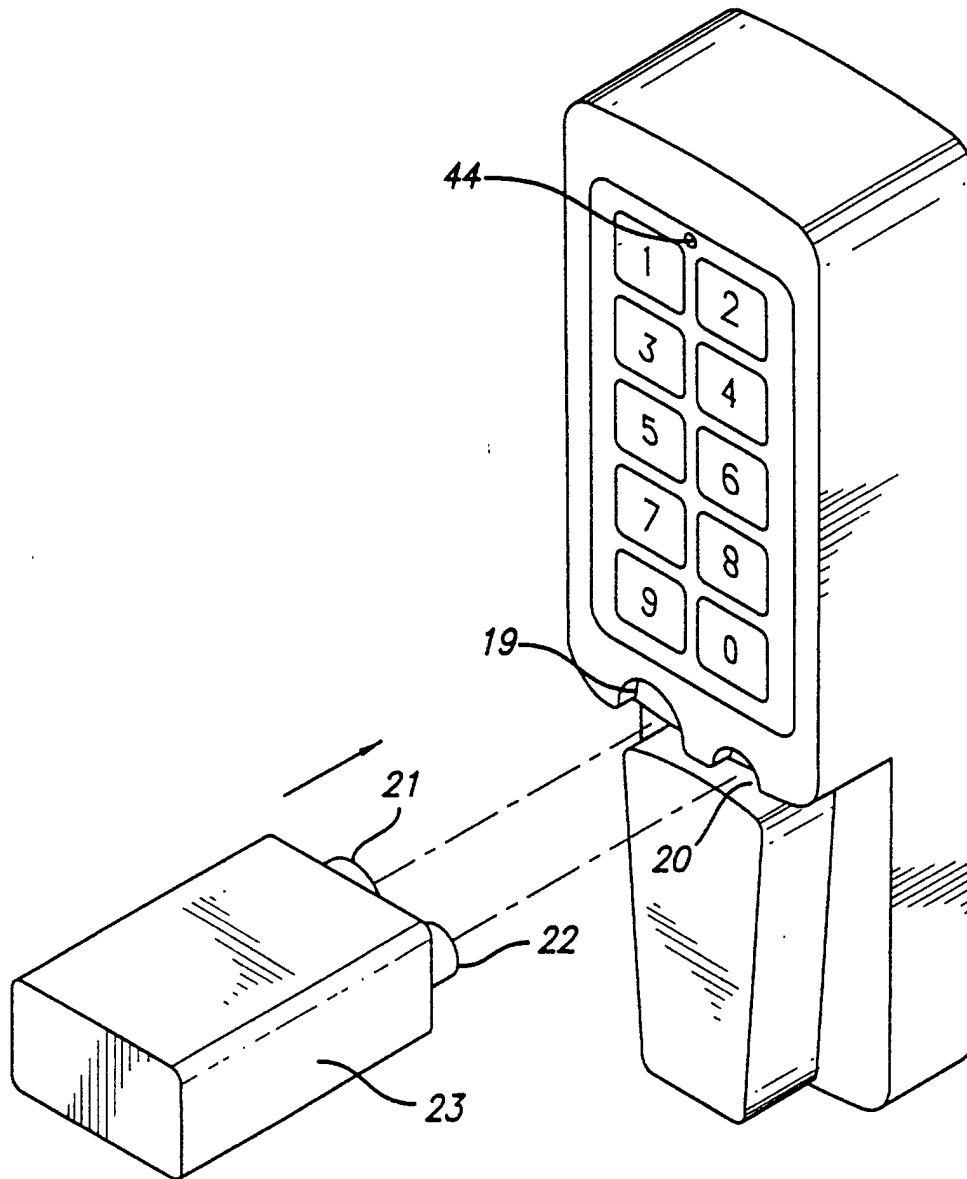


FIG. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 12 0977

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	US 4 148 092 A (MARTIN RICKY) 3 April 1979 (1979-04-03) * abstract * * column 2, line 12 - line 61 * * column 3, line 58 - column 5, line 56 * * column 12, line 10 - line 43; figures * ----	1-12	E05B49/00 E05B47/00
Y	US 5 887 467 A (BUTTERWECK DIETER ET AL) 30 March 1999 (1999-03-30) * abstract * * column 3, line 6 - line 47; figures * -----	1-12	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 9 November 2001	Examiner Teutloff, H
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/02 (P4/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 12 0977

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

09-11-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4148092 A	03-04-1979	NONE	
US 5887467 A	30-03-1999	DE 19602438 A1	14-08-1996
		GB 2297354 A ,B	31-07-1996
		GB 2331122 A ,B	12-05-1999
		US 5845523 A	08-12-1998
		DE 4442666 A1	05-10-1995
		GB 2287981 A ,B	04-10-1995
		US 6298699 B1	09-10-2001
		US 6116066 A	12-09-2000

EPO FORM P0459

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