



- (51) International Patent Classification:
E05B 47/00 (2006.01) *E05B 47/02* (2006.01)
- (21) International Application Number:
PCT/AU2016/050424
- (22) International Filing Date:
30 May 2016 (30.05.2016)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
2015902771 14 July 2015 (14.07.2015) AU
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- (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, 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, KN, KP, KR, 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, 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,

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(54) Title: A MAGNETIC FIELD GENERATOR FOR USE IN A LOCKING ARRANGEMENT

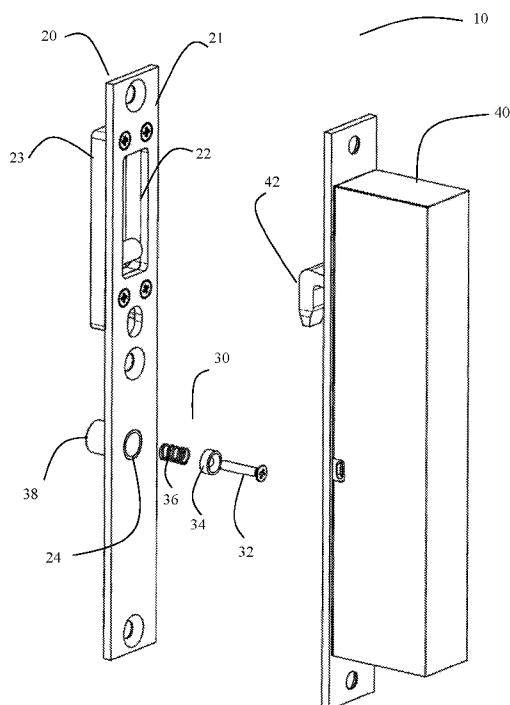


Fig 1

(57) Abstract: A magnetic field generator is described for use in a locking arrangement for locking a door or window in association with an adjacent building element including: a permanent magnet; a housing portion for receiving the magnet; an adjustment mechanism for allowing adjustment of the position of the magnet in the housing.

WO 2017/008104 A1



SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, **Published:**
GW, KM, ML, MR, NE, SN, TD, TG).

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

A MAGNETIC FIELD GENERATOR FOR USE IN A LOCKING ARRANGEMENT

Technical Field

The present invention relates to electronic locking arrangements for doors or
5 windows or the like and to a magnetic field generator for use in electronic locking
arrangements.

Summary of the Invention

In a first aspect the present invention provides a magnetic field generator for
10 use in a locking arrangement for locking a door or window in association with an
adjacent building element including: a permanent magnet; a housing portion for
receiving the magnet; an adjustment mechanism for allowing adjustment of the position
of the magnet in the housing.

The adjustment mechanism may allow for adjustment of the depth of the
15 magnet in the housing.

The adjustment mechanism may include a threaded rod, the magnet is mounted
on the threaded rod and adjustment of the position of the magnet is effected by rotating
the rod.

The magnet may be biased towards one end of the rod by a spring.

20 In a second aspect the present invention provides a strike plate including a
magnetic field generator according to the first aspect of the invention.

In a third aspect the present invention provides a locking arrangement for
selectively locking a door or window in association with an adjacent building element,
the arrangement including: an electrically operated lock; and a magnetic field generator
25 according to the first aspect of the invention; the lock and magnetic field generator are
mounted to respective ones of either the door or window or the adjacent building
element; the lock is operable between a locked condition and an unlocked condition, in
the locked condition the door or window is engaged with the adjacent building element
by the lock to resist opening of the door or window; the lock includes a magnetic field
30 detector and the lock is arranged to move from the unlocked to the locked condition
based on the strength of magnetic field detected by the magnetic field detector.

The lock may include a locking tongue which is provided with a hook
formation which engages with the adjacent building element.

Brief Description of the Drawings

An embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

5 Figure 1 is a perspective view of a locking arrangement incorporating a magnetic field generator according to an embodiment of the invention;

 Figure 2 is a side view of the locking arrangement of figure 1 with the lock adjacent the strike plate; and

 Figure 3 is an enlarged view of detail A of figure 2.

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Detailed Description of the Preferred Embodiment

Referring to figure 1, a locking arrangement 10 is shown for use in locking a sliding door to an adjacent building element such as a door frame. The locking arrangement includes an electronic lock 40 and a strike plate 20.

15 Strike plate 20 includes a magnetic field generator 30 which is shown in exploded view and comprises a housing portion in the form of well 38, an annular permanent magnet 34 and an adjustment mechanism including a threaded rod in the form of screw 32, and a biasing spring 36. The screw 32 is threadedly engaged with an aperture provided in the base of well 38 (see figure 3). The head of screw 32 is
20 accessible through aperture 24 of faceplate 21 to rotate the screw to adjust the position of magnet 34 in well 38 as will be later described.

 Lock 40 is of similar construction to the lock described in applicant's published international patent application WO2012/155177, the contents of which are incorporated herein by reference. Lock 40 differs to the lock described in
25 WO2012/155177 in that the locking tongue includes a hook formation 42 which is arranged to rotate outwardly to enter aperture 22 of strike plate 20. The hook formation engages with the reinforcing block 23 of strike plate 20 to retain the lock 40 in engagement with the strike plate (see figure 2). The lock 40 is arranged to be operated back to the unlocked condition by either cutting external power to the lock, or by
30 sending a command signal to the lock, depending upon the configuration adopted at the time of installation and the nature of any building control system in use.

 The above described locking arrangement is primarily intended for use with sliding doors. The strike plate 20 is affixed to the edge of a door and the lock 40 is

mounted into the door frame so that the locking tongue of lock 40 corresponds with the aperture 22 in strike plate 20.

In order for the locking arrangement 10 to function correctly, the lock 40 must be brought up close to strike plate 20 before the locking tongue rotates outwardly. If the locking tongue were to rotate outwardly before the door is closed then proper engagement with the strike plate cannot be achieved.

Referring to figure 3, control of the operation of the lock is based on the output of a magnetic field detector in the form of hall effect sensor 44. When the lock 40 is brought into proximity of the strike plate 20, the hall effect sensor detects the magnetic field produced by the permanent magnet 34. Lock 40 is arranged so that, when a magnetic field with a strength above a particular threshold is detected, the lock 40 moves to the locked condition.

The screw 32 of the magnetic field generator is rotated to adjust the depth of the magnet in well 38. This has the effect of varying the strength of the magnetic field detected at the hall sensor 40. If the magnet is moved deeper into the well (i.e. in a direction away from lock 40), then the magnetic field strength is made weaker. If the magnet is moved in the other direction (towards lock 40) then the magnetic field becomes stronger.

The position of the magnet 34 is adjusted so that the threshold of output of the hall effect sensor is reached when the outer surface of lock 40 is approx. 1 to 2mm away from the outer surface of faceplate 21 of strike plate 20. This adjustment is made at the time of the installation in the following manner:

1. Install strike plate 20 and lock 40.
2. Screw in screw 32 to its fullest extent to generate weakest magnetic field.
3. Close door. It expected that lock 40 will not detect a sufficiently strong magnetic field and so will not operate.
4. Open door and turn screw by one or two turns to move magnet outwardly.
5. Close door and repeat adjustment of screw as necessary until operation of lock occurs when the outer surface of lock 40 is approximately 1 to 2mm from the outer surface of faceplate 21.

Although the arrangement above has been described with reference to sliding

doors it could also be used in relation to hinged doors.

Although the arrangement above has been described with reference to doors it could also be used in relation to windows.

Although the arrangement described above utilised a magnetic field detector in the form of a hall effect sensor, other embodiments may use different types of detector such as a reed switch.

It can be seen that embodiments of the invention provide at least the following advantages:

- Differences in magnet strengths or sensor sensitivities can be accommodated by a screw operated adjustment mechanism.
- The activation point of an electronic lock can be easily adjusted.

Any reference to prior art contained herein is not to be taken as an admission that the information is common general knowledge, unless otherwise indicated.

Finally, it is to be appreciated that various alterations or additions may be made to the parts previously described without departing from the spirit or ambit of the present invention.

CLAIMS:

1. A magnetic field generator for use in a locking arrangement for locking a door or window in association with an adjacent building element including:
a permanent magnet;
a housing portion for receiving the magnet;
an adjustment mechanism for allowing adjustment of the position of the magnet in the housing.
2. A magnetic field generator according to claim 1 wherein the adjustment mechanism allows for adjustment of the depth of the magnet in the housing.
3. A magnetic field generator according to either of claim 1 or claim 2 wherein the adjustment mechanism includes a threaded rod, the magnet is mounted on the threaded rod and adjustment of the position of the magnet is effected by rotating the rod.
4. A magnetic field generator according to claim 3 wherein the magnet is biased towards one end of the rod by a spring.
5. A strike plate including a magnetic field generator according to any one of claims 1 to 4.
6. A locking arrangement for selectively locking a door or window in association with an adjacent building element, the arrangement including:
an electrically operated lock; and
a magnetic field generator according to any one of claims 1 to 4;
the lock and magnetic field generator are mounted to respective ones of either the door or window or the adjacent building element;
the lock is operable between a locked condition and an unlocked condition, in the locked condition the door or window is engaged with the adjacent building element by the lock to resist opening of the door or window;
the lock includes a magnetic field detector and the lock is arranged to move from the unlocked to the locked condition based on the strength of magnetic field detected by the magnetic field detector.
7. A locking arrangement according to claim 6 wherein the lock includes a locking tongue which is provided with a hook formation which engages with the adjacent building element.

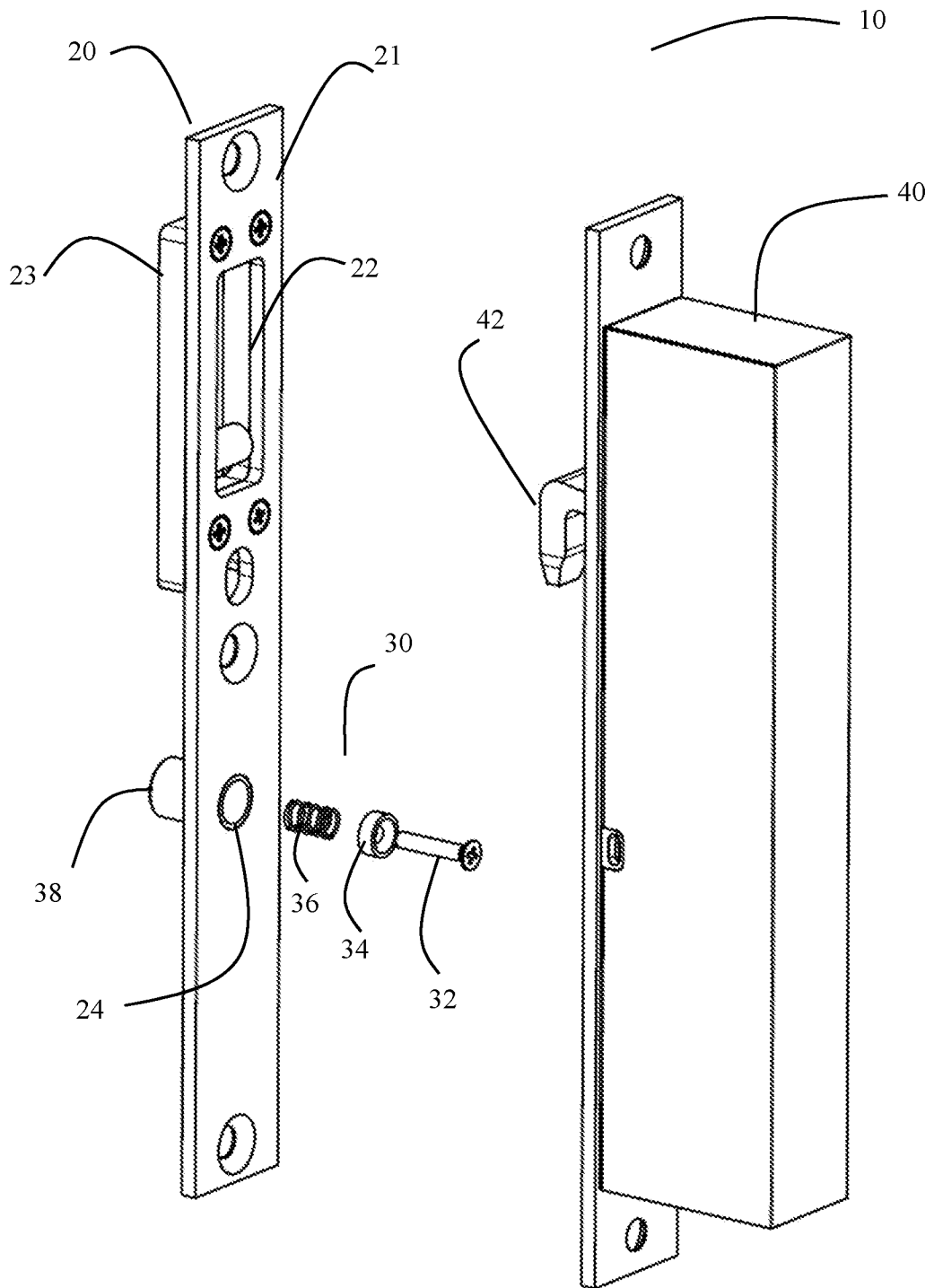


Fig 1

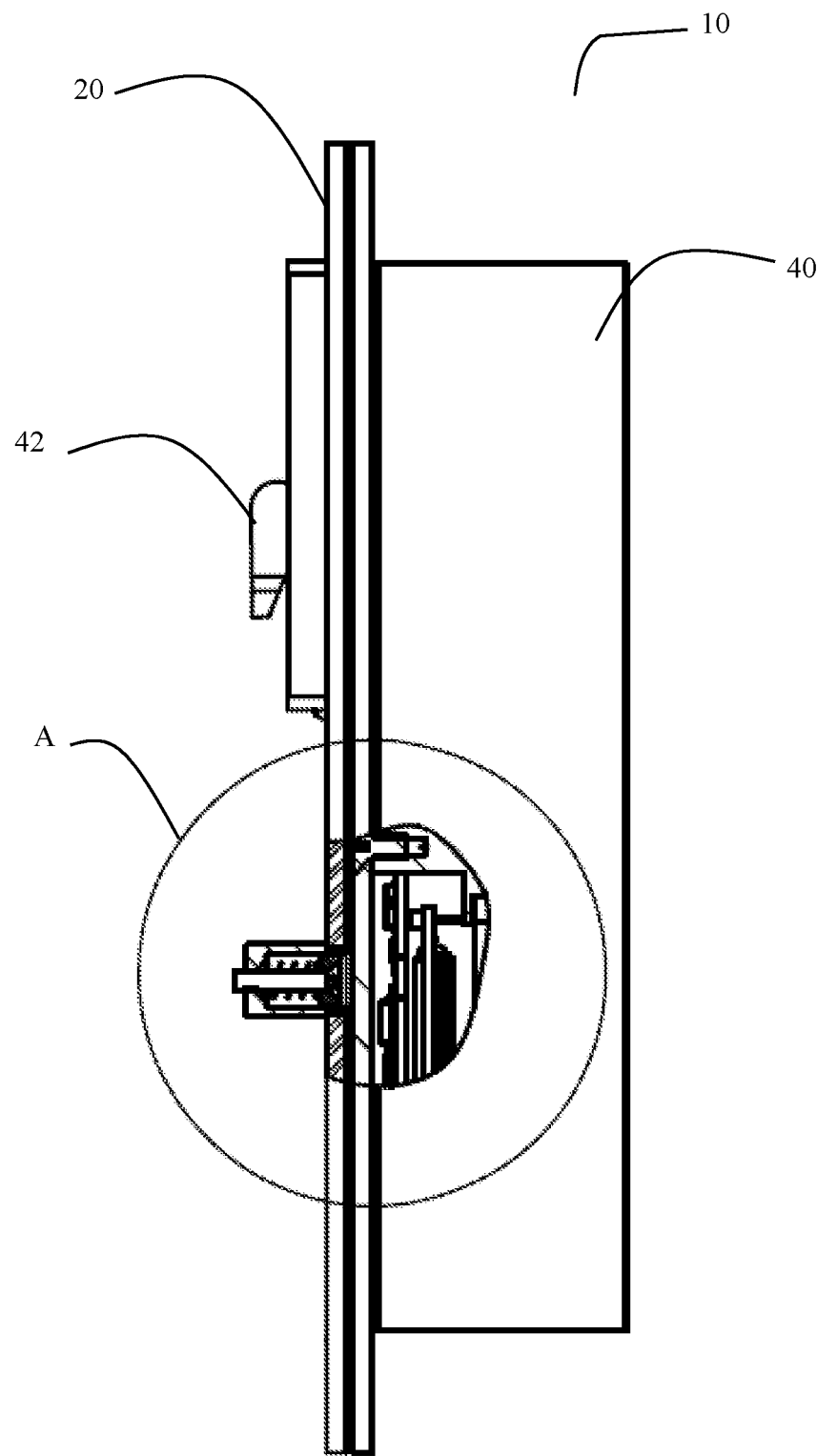


Fig 2

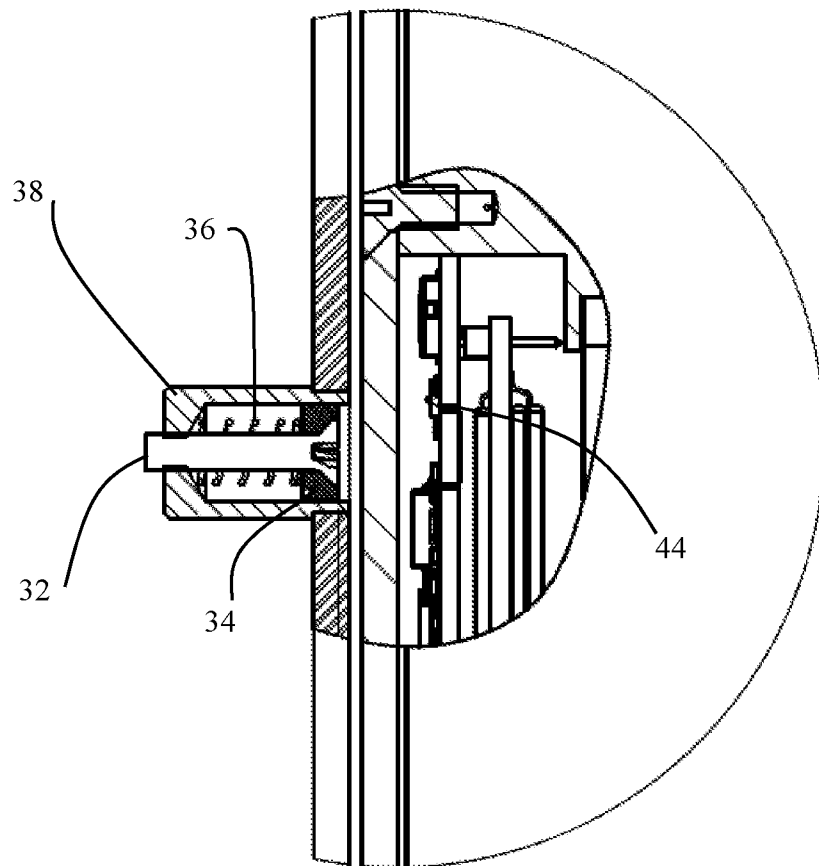


Fig 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2016/050424

A. CLASSIFICATION OF SUBJECT MATTER

E05B 47/00 (2006.01) E05B 47/02 (2006.01)

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)

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)

EPODOC and WPIAP:IPC, CPC: E05B2047/0068, E05B47/0038, E05B47/0046, E05B2047/0072, E04B47/004, E05B63/20, E05B, E05C & Keywords: MAGNET, SCREW, TURN, ADJUST, CHANGE, MODIFY, POSITION, THREAD, STRENGTH, DEPTH, POWER, OUTPUT, HALL, SENSOR, DETECTOR, FIELD, GENERATOR, HOUSING, CASE, RECEIVER, COVER, HALL, REED, TUNING, CALIBRATE, STRIKE, CLOSE, PROXIMITY, SHUT, ADJACENT, NEAR AND SIMILAR TERMS. Google Patent: similar keywords as above. Espacenet: Applicant and inventor name. AUSPAT: Applicant and inventor name. Applicant(s)/Inventor(s) name searched in internal databases provided by IP Australia

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	



Further documents are listed in the continuation of Box C



See patent family annex

* "A"	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance	"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
"E"	earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search 26 July 2016		Date of mailing of the international search report 26 July 2016	
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustalia.gov.au		Authorised officer Yuelin Wang AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832402	

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/AU2016/050424
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/070062 A1 (ROCA FINLAND OY) 06 July 2006 Abstract and Fig.1-Fig.7, P.6, lines 4-9	1-7
X	EP 1746229 A2 (ASSA AB) 24 January 2007 Abstract and Fig.1-Fig.2c	1
X	EP 2333204 A1 (OLIANA PIER LUIGI) 15 June 2011 Abstract and Fig.1-Fig.8	1

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INTERNATIONAL SEARCH REPORT Information on patent family members		International application No. PCT/AU2016/050424	
This Annex lists known 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/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
WO 2006/070062 A1	06 July 2006	WO 2006070062 A1	06 Jul 2006
		FI 20041698 A	01 Jul 2006
EP 1746229 A2	24 January 2007	EP 1746229 A2	24 Jan 2007
		EP 1746229 B1	16 Mar 2011
		NO 20063349 A	22 Jan 2007
		SE 0501704 A	02 May 2006
EP 2333204 A1	15 June 2011	EP 2333204 A1	15 Jun 2011
		EP 2333204 B1	03 Jul 2013
End of Annex			

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.