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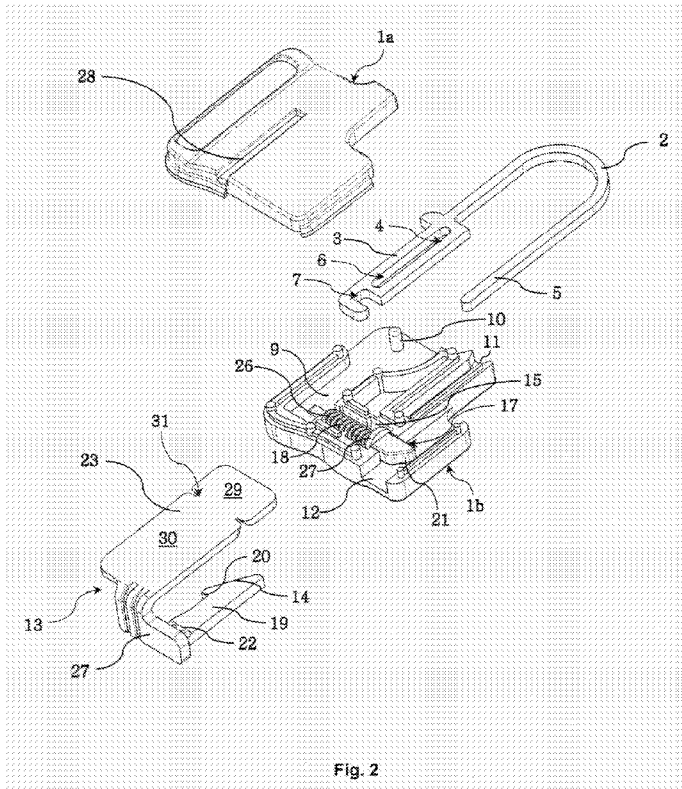
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(54) Title: PADLOCK



(57) Abstract: A padlock which comprises a generally U-shaped hasp (2), a lock body (1), and a locking key (13). The hasp (2) has one leg longer than the other. Said longer leg (3) has an end portion (4) wider than the rest of the hasp (2). The wider portion (4) has an elongate slot (6) which extends parallel to the leg (3), and a recess (7) which opens sideways towards the shorter leg (5). The lock body (1), the interior of which has a first blind passage (9) towards one side of the body (1) for receiving the wider portion (4) of the hasp (2) and has a peg (10) for engagement with the slot (8) in the wider portion (4), a second blind passage (11) for receiving the shorter leg (5), a third passage (12) for receiving a locking key (13) which has a chamfered end (14): and a transverse passage (15) for receiving a spring loaded locking pin (17). The arrangement is such that the hasp (2) can be moved between a locked position in which the locking pin (17) is engaged in the recess (7) in the wider portion (4), and an unlocked position in which the locking pin (17) extends into the third passage (12) under the influence of the spring (18). Methods for locking and unlocking the padlock are also disclosed.



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## PADLOCK

This invention relates to a padlock for securement of possession, more specifically, to a padlock having tamper evident feature.

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### BACKGROUND OF THE INVENTION

The padlock is a convenient lock used to secure possession from unauthorised manipulation or theft. In many applications, a padlock is provided with a tamper evident feature to provide evidence that a locked possession has been tampered with. Most tamper-evident padlocks as used on airline trolleys or luggage consist of a lock body, a hasp, and a locking key (also known as a disposable seal). This type of padlock frees the user of need to carry a key, an advantage which eliminates possibility of loss of the key. Compared to padlock with number combination codes, the user needs not memorise the code or worry about jammed dials.

US 7118144 B2 discloses a tamper-evident padlock and padlock combination. The padlock has a moulded plastic lock body which includes an open-ended passage and an opening spaced from the passage. There is also a hasp which has first and second spaced apart legs. An end of the first leg can be located in the passage through a first end thereof while the end of the second leg can be located simultaneously in the opening. The end of the first leg in the passage can then be engaged by a breakable seal which is inserted into the passage through the opposite end of the passage, in order to lock the hasp relative to the lock body. The padlock combination comprises the padlock and the seal in combination.

A drawback of the above-mentioned invention is that any pulling force exerted on the hasp transfers directly to the frangible portion of the seal, which at times causes accidental breakage of the seal, resulting in removal of the hasp from its locked position.

US 7370892 B2 discloses a security seal which has housing and a hasp moveable relative to the housing in a first direction between a locked

position and an unlocked position. The hasp, in the locked position, is lockable to the housing by a disposable seal. The housing has an opening to allow the insertion of the disposable seal in a second direction different from the first direction. The hasp includes a first locking element engageable, in the locked position, with a second, matching locking element of the disposable seal to prevent movement of the hasp in the first direction toward the unlocked position and withdrawal of the disposable seal in the second direction. The hasp is attached to the housing so as to be both slidable and pivotable relative to the housing.

10 The above-mentioned invention improves on the previous invention by employing a seal transversely. Nevertheless, accidental breakage of the seal still occurs occasionally, when the pulling force exceeds strength of the heads of the insertion portion of the seal.

#### 15 SUMMARY OF THE INVENTION

According to the invention, the drawbacks of the prior padlocks are overcome by a padlock which comprises a generally U-shaped hasp, a lock body, and a locking key. The hasp has one leg longer than the other. Said longer leg has an end portion wider than the rest of the hasp. The wider portion has an elongate slot which extends parallel to the leg, and a recess which opens sideways towards the shorter leg. The lock body, the interior of which has a first blind passage towards one side of the body for receiving the wider portion of the hasp and has a peg for engagement with the slot in the wider portion, a second blind passage for receiving the shorter leg, a third passage for receiving a locking key which has a chamfered end, and a transverse passage for receiving a spring loaded locking pin. The arrangement is such that the hasp can be moved between a locked position in which the locking pin is engaged in the recess in the wider portion, and an unlocked position in which the locking pin extends into the third passage under the influence of the spring. The locking key comprises a shaft which has an undercut chamfered end that when inserted into the third passage engages the chamfered end of the locking

pin, and forces it into the transverse passage to enter the recess in the wider portion, after which the locking pin springs back to engage under the undercut to prevent removal of the key. Said key has a frangible end portion of the shaft to hold the key in position until the end portion is broken off.

Preferably, the longer leg has a protrusion disposed on the side opposite the edge of the wider portion; said protrusion hinders intrusion to the interior of the lock body when the hasp is in the locked position.

Advantageously, the first passage is defined by a generally P-shaped depression which has the head portion of the P shape trimmed to allow the hasp to rotate about the peg.

The invention also discloses a method for locking the padlock. The method comprises a step of inserting the shaft of the locking key into the third passage via an opening of the third passage disposed on an end of the lock body opposite the hasp, such that the chamfered end of the shaft engages the chamfered end of the locking pin, and forces it into the transverse passage to enter the recess in the wider portion, after which the locking pin springs back to engage under the undercut to prevent removal of the key.

Furthermore, the invention discloses a method for unlocking the padlock. The method comprises steps of: tearing along the frangible end portion of the shaft of the locking key, and breaking off the tab portion and the transverse portion of the key; and pushing the shaft and the undercut head through the passage to release the locking pin.

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### DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention will now be described in greater detail, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of one form of a padlock according to the invention, in which a hasp is in a locked position and a locking key is disengaged from a through passage of a lock body;

Fig. 2 is a partially exploded view of the padlock shown in Fig. 1;

5 Fig. 3 is a front view of the padlock shown in Fig. 1 with a lock cover removed and the hasp in a locked position; and

Fig. 4 is a front view of the padlock shown in Fig. 1 with the lock cover removed, the hasp in the locked position, and a shaft of the locking key residing in the through passage in the lock body.

- 10 As shown in the drawings, a padlock comprises a lock body that is formed by two parts 1a, 1b. The lock body 1 has a first blind passage 9 disposed in proximity to one edge, a second blind passage 11 parallel to the passage 9, at about the middle of the lock body 1, a through passage 12 disposed in proximity to an opposing edge of the lock body 1, and a
- 15 transverse passage 15 extending from the first passage 9 to the through passage 12 without intersecting the second passage 11. A generally U-shaped hasp 2 has one leg 3 longer than the other 5. The longer leg 3 has on one side a portion 4 wider than the rest of the hasp 2. The wider portion 4 has an elongate slot 6 which extends parallel to the leg 3, and a recess
- 20 7 which opens sideways towards the shorter leg 5. The longer leg 3 has a protrusion 24 disposed on the side opposite the edge of the wider portion 4 to prevent access to the interior of the lock body 1 when the hasp 2 is in the locked position. The first passage 9 receives the wider portion 4 of the
- 25 hasp 2 and has a peg 10 for engagement with the slot 6 in the wider portion 4; the first passage 9 is defined by a generally P-shaped depression having the head portion of the P shape trimmed to allow the hasp 2 to rotate about the peg 10. The second passage 11 receives the shorter leg 5, and the transverse passage 15 receives a spring-loaded locking pin 17.
- 30 The locking pin 17 is moveable between a locked position in which it engages the recess 7 of the wider portion 4 of the longer leg 3, and an

unlocked position in which a chamfered end 21 protrudes into the third passage 12. The locking pin 17 comprises the chamfered end 21, a rod portion 26 around which a spring 18 is loaded, and a collar 27 disposed between the chamfered end 21 and the rod portion 26. The collar 27 acts  
5 as a stopper to prevent the rod portion 26 from extending into the through passage 12, while allowing the chamfered end 21 to protrude perpendicularly into the through passage 12 by force exerted by the spring 18.

The locking key 13 comprises a shaft 19 which has a chamfered end 14.  
10 The chamfered end 14 has an undercut point 20. The shaft 19 also has a frangible end portion 22. A tab portion 23 is connected to the shaft 19 by a transverse portion 27 disposed perpendicularly between the shaft 19 and the tab portion 23. The tab portion 23 has on one of its surface a ridge (not shown in the figure) protruding towards the shaft 19. The ridge is mated to  
15 a groove 28 in cover 1a of the lock body 1, which guides the insertion of the shaft 19 into the through passage 12.

The hasp 2 is made of spring steel plated with nickel, and the lock body 1 is made of ABS (acrylonitrile-butadiene-styrene) which has an excellent cold resistance, i.e. as low as  $-10^{\circ}\text{C}$ .

20 From experiments, the spring 18 (as that loaded on the locking pin 17) is found to be able to sustain a considerable weight for as long as two weeks without experiencing permanent loss of resilience. A tensile test shows that the hasp 2 as locked by the locking key 13 is able to withstand a force as high as 83 kilogram-force. In terms of durability, the padlock is capable  
25 of being locked and unlocked for as many as five hundred times before it fails to function as it should.

To lock the padlock, the shaft 19 of the locking key 13 is inserted into the third passage 12 via an open end of the third passage 12 disposed on an end of the lock body 1 opposite the hasp 2, such that the undercut head  
30 14 of the shaft 19 engages the chamfered end 21 of the locking pin 17 and forces it into the transverse passage 15 to enter the recess 7 in the wider

portion 4 after which the locking pin 17 springs back to engage under the undercut 20 to prevent removal of the key 13.

To unlock the padlock, the shaft 19 of the locking key 13 is torn along the frangible end portion 22 of the key 13 is broken off, so that the shaft 19  
5 and the undercut head 14 can be pushed through the passage 12 to release the locking pin 17.

As shown in Fig. 1 and 2, laser print may be made on a smaller part 29 of the tab portion 23, and a corresponding laser print may be made on a larger part 30 of the tab portion 23. During use, the smaller part 29 is  
10 broken off along a frangible portion 31 and kept by user for identification during redemption of his or her locked possession.

CLAIMS

1. A padlock comprising:

5 a generally U-shaped hasp (2) having one leg longer than the other; said longer leg (3) having an end portion (4) wider than the rest of the hasp (2); the wider portion (4) having an elongate slot (6) extending parallel to the leg (3), and a recess (7) opening sideways towards the shorter leg (5);

10 a lock body (1) the interior of which has a first blind passage (9) towards one side of the body for receiving the wider portion (4) of the hasp (2) and a peg (10) for engagement with the slot (6) in the wider portion (4), a second blind passage (11) for receiving the shorter leg (5), a third passage (12) for receiving a locking key (13) having a chamfered end (14), and a transverse passage (15) for receiving a spring loaded locking pin (17), the arrangement being  
15 such that the hasp (2) can be moved between a locked position in which the locking pin is engaged in the recess (7) in the wider portion (4), and an unlocked position in which the locking pin (17) extends into the third passage (12) under the influence of the spring (18); and

20 the locking key (13) comprising a shaft (19) having an undercut chamfered head (14) that when inserted into the third passage (12) engages the chamfered end (21) of the locking pin (17) and forces it into the transverse passage (12) to enter the recess (7) in the wider portion (4) after which the locking pin (17) springs back to engage  
25 under the undercut (20) to prevent removal of the key (13), the key (13) also having a frangible end portion (22) of the shaft (19) to hold the key (13) in position until the end portion (22) is broken off.

- 30 2. A padlock as claimed in claim 1, wherein the longer leg (3) has a protrusion (24) disposed on the side opposite the edge of the wider portion (4); said protrusion (24) hinders intrusion to the interior of the lock body (1) when the hasp (2) is in the locked position.

3. A padlock as claimed in claims 1 or 2, wherein the first passage (9) is defined by a generally P-shaped depression having the head portion of the P shape trimmed to allow the hasp (2) to rotate about the peg (10).

4. A method for locking the padlock as claimed in any one of claims 1 to 3, comprising step of:

inserting the shaft (19) of the locking key (13) into the third passage (12) via an opening of the third passage (12) disposed on an end of the lock body (1) opposite the hasp (2), such that the chamfered end (14) of the shaft (19) engages the chamfered end (21) of the locking pin (17) and forces it into the transverse passage (15) to enter the recess (7) in the wider portion (4) after which the locking pin (17) springs back to engage under the undercut (20) to prevent removal of the key (13).

5. A method for unlocking the padlock as claimed in any one of claims 1 to 3, comprising steps of:

tearing along the frangible end portion (22) of the shaft (19) of the locking key (13), and breaking off the tab portion (23) and the transverse portion (27) of the key (13); and

pushing the shaft (19) and the undercut (20) head through the passage (12) to release the locking pin (17).

25

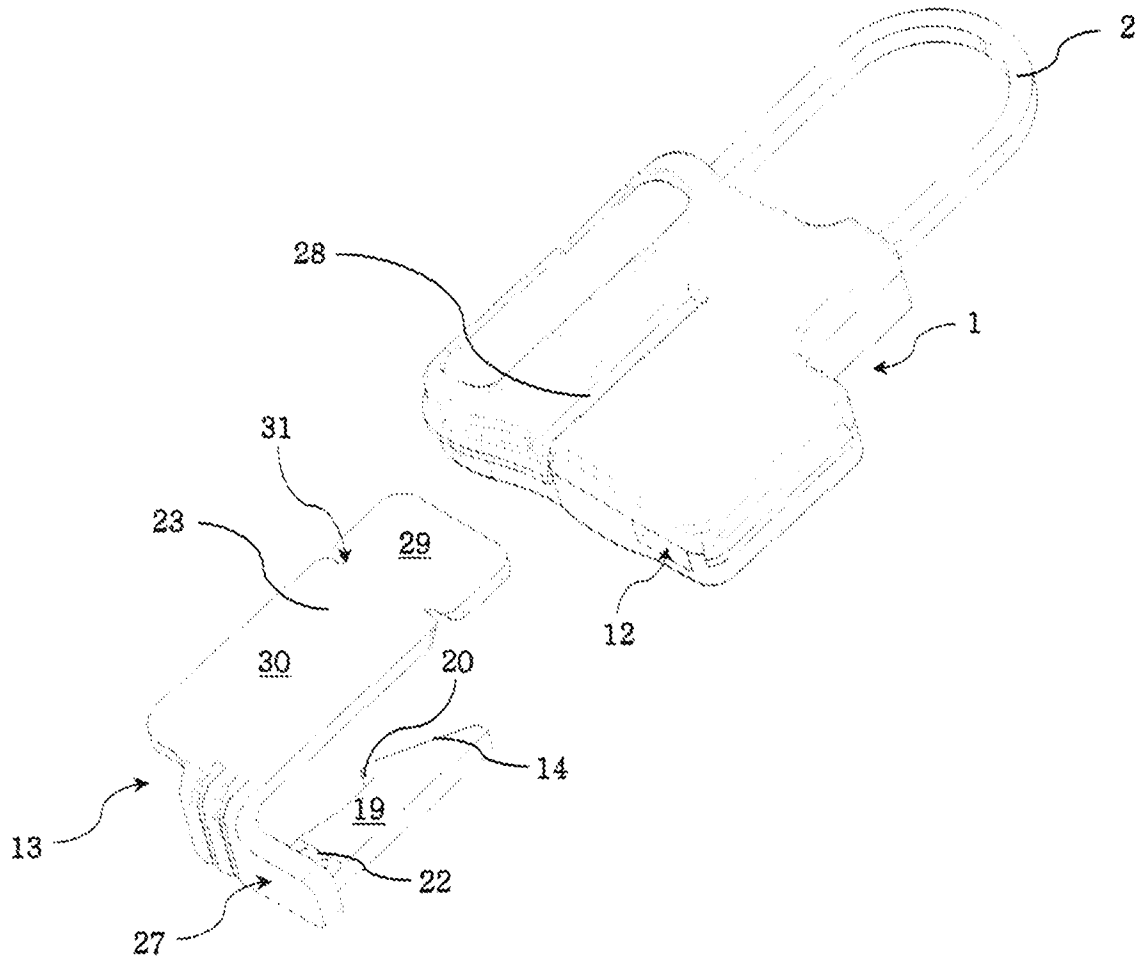


Fig. 1

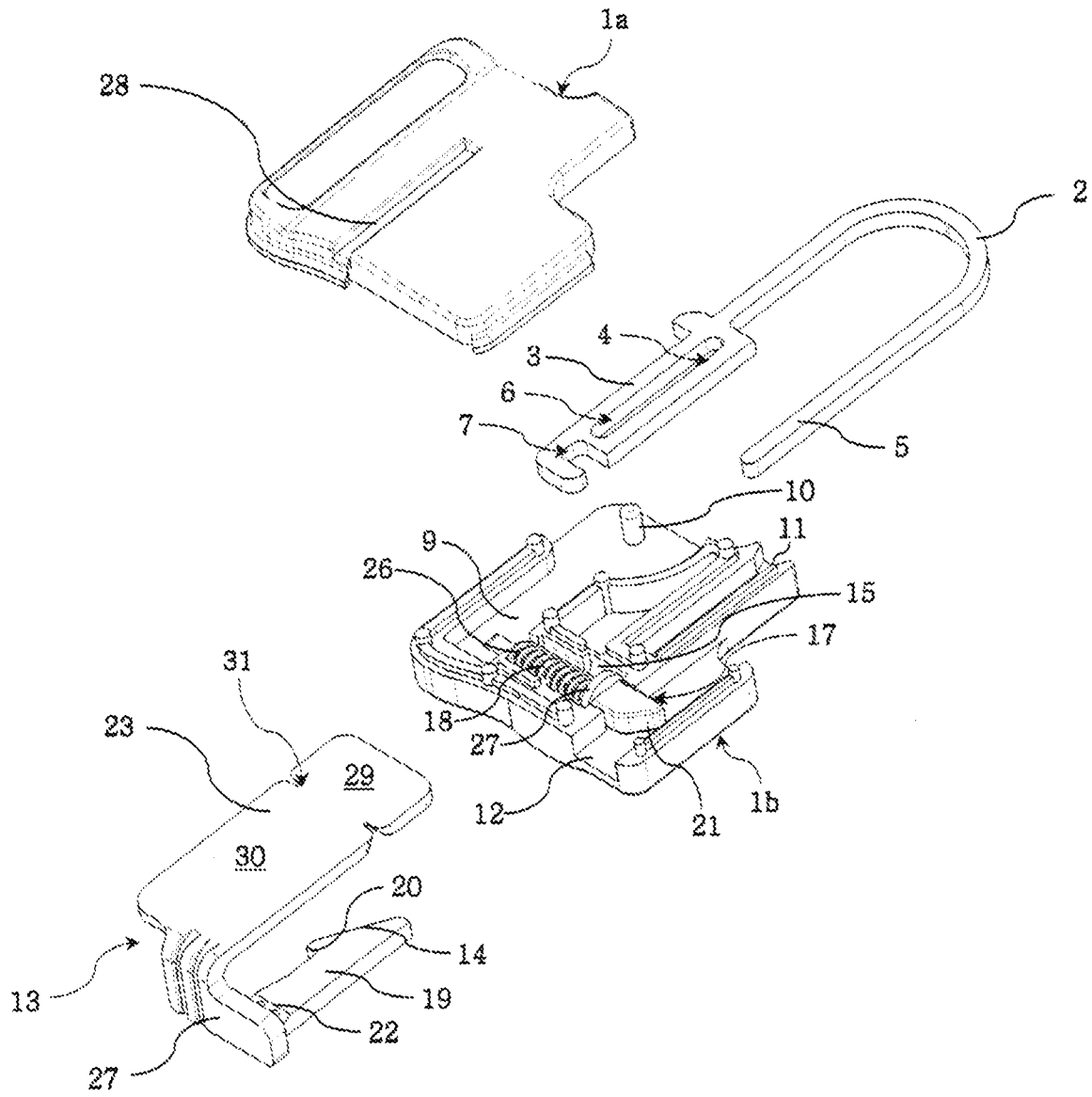


Fig. 2

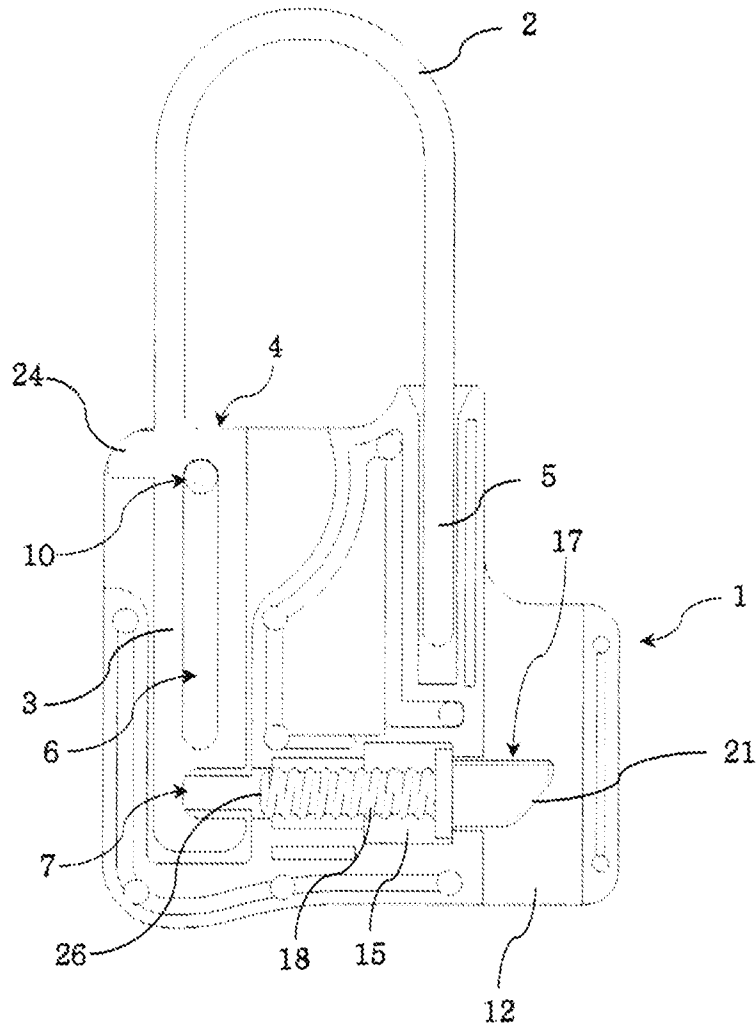


Fig. 3

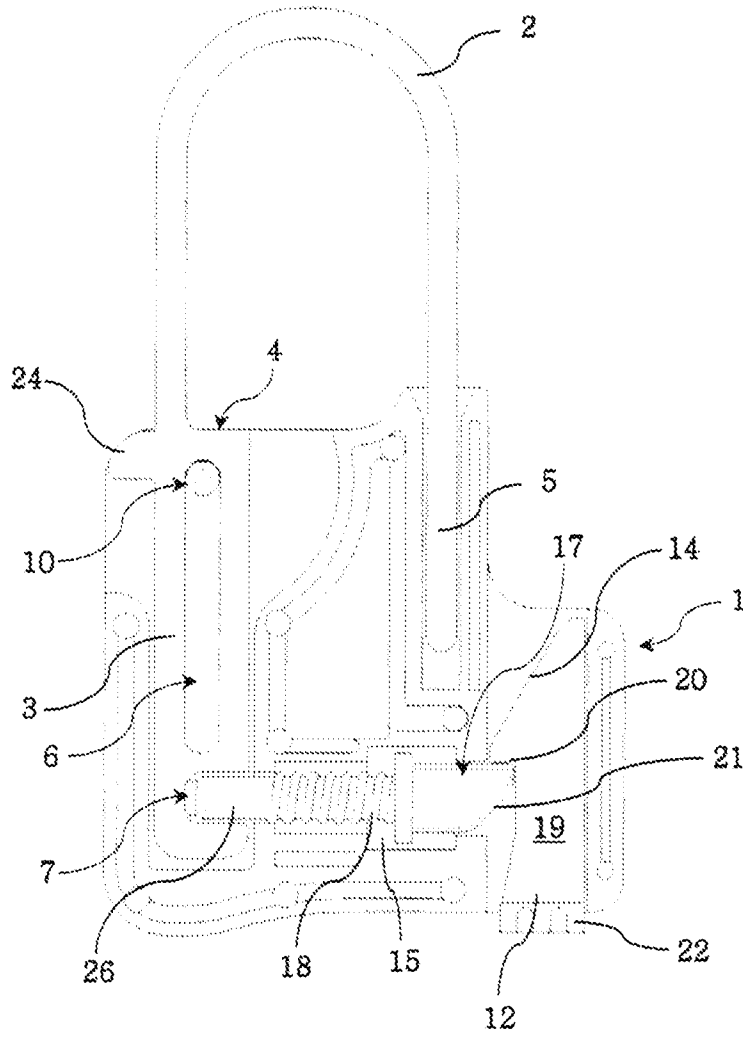


Fig. 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/MY2014/000121

## A. CLASSIFICATION OF SUBJECT MATTER

**E05B 39/02 (2006.01) E05B 67/14 (2006.01) G09F 3/03 (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)

CPC - G09F3/0358, G09F3/0347; US Classification - 292/328; 292/329

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)

WPI, EPODOC - IPC, CPC: E05B19, E05B39/02/low, E05B65, E05B67, E05B73, E05C19, G09F3/03/low; US CLASS: 292/327, 292/307? & Keywords (padlock, hasp, shackle, break, tear, frangible, seal, key, release, tamper, interfere, thief, attack, vandal, indicate, evident); Applicant/Inventor Keywords (titan, design, suffian, abdullah)

## 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

|   |     |  |
|---|-----|--|
| * Special categories of cited documents:  |     |  |
| "A" 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   |
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| "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  
9 December 2014

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09 December 2014

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| <b>INTERNATIONAL SEARCH REPORT</b>                    |   | International application No. |
|---|---|-------------------------------|
| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |   | <b>PCT/MY2014/000121</b>      |
| Category*   | Citation of document, with indication, where appropriate, of the relevant passages          | Relevant to claim No.         |
| A   | US 2006/0202489 A1 (COLLINGHAM) 14 September 2006<br>Abstract; figures 1-5                  | 1-5                           |
| P,A   | CN 203531545 U (CAI JUNCHEN) 09 April 2014<br>Abstract; paragraphs 19-22; figures 1-6       | 1-5                           |
| A   | DE 341824 C (PAUL SCHIEBE) 08 October 1921<br>Page 2, lines 11-50; figures 1-5              | 1-5                           |
| A   | US 2007/0262594 A1 (HUDSON et al.) 15 November 2007<br>Paragraphs 7, 16-17, 21; figures 1-7 | 1-5                           |
|   |   |                               |

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/MY2014/000121**

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.

| <b>Patent Document/s Cited in Search Report</b> |                         | <b>Patent Family Member/s</b> |                         |
|---|-------------------------|-------------------------------|-------------------------|
| <b>Publication Number</b>                       | <b>Publication Date</b> | <b>Publication Number</b>     | <b>Publication Date</b> |
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|   |                         | CA 2538396 A1                 | 08 Sep 2006             |
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**End of Annex**