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(54) **IMPROVED HOOK LOCK**

(57) A hook lock mechanism comprises a hook which pivots about an axis and is movable between at least a position in which it is locked and can act as a dead bolt for a lock and a position in which it is not locked but can

act as a latch bolt for a lock. Locks comprising said hook lock mechanism, and methods of locking and unlocking gates with said locks are also disclosed.

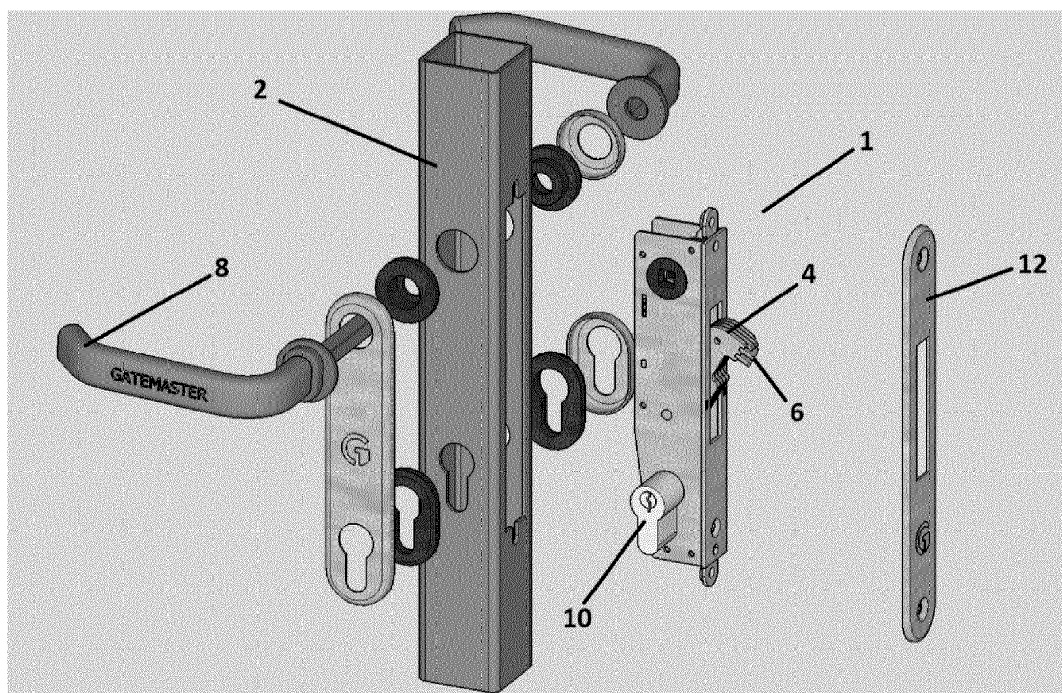


Fig. 1

Description

Introduction

[0001] The present invention relates to a hook lock and uses of the lock in securing gates and doors.

Background to the Invention

[0002] Various types of lock mechanism are known in the art. Latch bolt locks use a spring to hold the bolt in place, allowing retraction by applying force to the bolt itself, whereas dead bolts are thrown by a mechanism that requires rotation of a key in the lock cylinder in order to move between retracted and projecting positions.

[0003] An alternative to a standard dead bolt, for the sake of dead-locking a door or gate, is a hook or "pivotally-mounted bolt" that rotates from a vertical (unlocked) position to a horizontal (locked) position where the hook is secured by a keeper, preventing opening or closing of the door or gate without a key. This type of hook-shaped dead bolt is described e.g. in EP 2186974.

[0004] Locks often make use of a combination of dead-locking means and latch-locking means to provide a mixture of convenience and security.

[0005] Hook locks are typically used in settings where it is important to keep the unit value of the lock to a minimum. As such, simple manufacturing processes and efficiency of procedure are key in making successful hook locks.

[0006] It is clear from the technical field that there exists a need for alternative and, preferably, improved hook lock mechanisms that provide the end user with both convenience and security for minimal cost.

[0007] An aim of the present invention is therefore to provide a hook lock mechanism that is simpler and more versatile than previous hook locks, while maintaining the same level of security and convenience.

Summary of the Invention

[0008] The invention provides a hook lock mechanism, comprising a hook which pivots about an axis, characterized in that the hook is movable between at least (1) a position in which it is locked and can act as a dead bolt for a lock and (2) a position in which it is not locked but can act as a latch bolt for a lock.

[0009] The hook preferably comprises a latch ramp at its distal end.

[0010] The invention also provides a hook lock mechanism, comprising a hook which pivots about an axis, characterized in that the hook comprises a latch ramp at a distal end thereof.

[0011] The latch ramp is preferably angled to contact and pass over a strike plate with reduced resistance. Preferably, therefore, the latch ramp has a rounded and/or bevelled surface for contacting a strike plate. The surface / edge of the latch ramp may engage the strike

plate at an angle, and an embodiment of this type is shown in the example; alternatively, the surface / edge engaging the strike plate is optionally substantially vertical at the point of contact. In preferred embodiments, the latch ramp is made of a low friction, durable material. Preferably, the latch ramp is or comprises brass. An advantage of the latch ramp is that the hook can operate as a latch regardless of whether the strike plate is constructed to assist movement of the hook, e.g. if the strike plate is a flat surface then a hook of the type known in the art cannot be used as a latch; this aspect of the invention overcomes this problem.

[0012] The position of the latch ramp at the distal end of the hook is preferably adjustable. This is advantageous in that the latch ramp can be positioned to contact a strike plate in the most efficient manner. Furthermore, it allows for use of the lock mechanism regardless of the handedness of the lock (in which the mechanism is fitted) and regardless of whether the gate / door (to which the lock is fitted) is inward opening or outward opening.

[0013] The hook is preferably movable between at least a position in which it is locked and can act as a dead bolt for a lock and a position in which it is not locked but can act as a latch bolt for a lock. As shown in an example below, the hook may thus both latch in one position and lock in another.

[0014] The hook is preferably moveable (e.g. pivotable or rotatable) between three main positions:

- i. a first position, wherein it is retracted, e.g. from a keeper;
- ii. a second position, wherein it is latched, e.g. in its keeper but free to move back into the first position; and
- iii. a third position, wherein it is locked, e.g. unable to freely move back into its first and second positions e.g. without assistance from a key.

[0015] In its first position, the hook is preferably biased towards its second position. Preferably, the biaser is a spring. When in use as part of a lock on e.g. a gate, this first position allows the gate to swing open and closed.

[0016] In its second position, the hook is free to move (preferably against a biaser) back into its first position without the need for e.g. a key. Movement into its third position preferably requires actuation of the mechanism with e.g. a key. When in use as part of a lock on e.g. a gate, this position allows the gate to remain closed but not dead-locked; in other words, the gate is latched. In an example, the gate can be opened from its latched position with a handle but without the need for a key. The gate can then swing closed with the hook in its second position because, advantageously, the hook has a latch ramp for passing over a strike plate fitted e.g. to the gate post.

[0017] In its third position, the hook is unable to move back into its second position or its first position without actuation of the mechanism with e.g. a key. When in use

as part of a lock on e.g. a gate, this position allows the gate to remain dead-locked.

[0018] It is preferred that, when the hook is in its second position outside a gate keeper, it is moveable in a plane that results in it laterally impacting a strike plate on a gate to which a keeper is fitted. Movement in this plane causes the hook to retract slightly from its second position (towards its first position) upon impacting the strike plate, before it returns via bias to its second position within the gate keeper and is thus latched.

[0019] It is preferred that, when the hook is in its second position inside the gate keeper, it is no longer moveable in the same plane mentioned above (determined according to the path followed by the gate swinging open or closed). Instead, the hook is moveable only in the plane of the gate between its first, second and third positions, such that the hook can move either into its retracted position or into its dead-locked position.

[0020] Actuation of the hook lock mechanism is preferably by means of a mechanical keypad, a digital keypad, an electrically-operated interface, a wirelessly-operated interface, a solenoid, a card reader, a contactless pad, a push button, a rotating knob, a handle, or a key. Most preferably, a key is used to actuate the mechanism. As mentioned elsewhere, actuation of the mechanism using e.g. a combination of the key and another actuation moves the hook between its three main positions.

[0021] Preferably, the lock is actuated by a cylinder-operated mechanism, e.g. via a key.

[0022] The invention thus provides a hook lock mechanism that is capable of both latch-locking and dead-locking, removing the need to have separate mechanisms for dead-locking and latch-locking a hook-based lock.

[0023] The invention further provides a lock for a gate or door comprising a hook lock mechanism as described above and below. The hook provides three main lock positions about its axis:

- i. a first lock position, wherein the gate or door is free to move between open and closed positions;
- ii. a second lock position, wherein the gate or door can be latched, e.g. fastened but not dead-locked; and
- iii. a third lock position, wherein the gate or door can be dead-locked.

[0024] Hook locks typically are or comprise normal (conventional) locksets, wherein the dead bolt is replaced with a rotatable hook-like member which engages a keeper to lock a door or gate.

[0025] In use, the lock of the invention is mounted on or within a gate or door. The hook of the lock mechanism is then able to rotate about its axis between the three lock positions.

[0026] Preferably, the lock is a gate lock. Preferably, still, the gate to which the lock is fitted is metal in composition. It is preferred that the gate to which the lock is

fitted is a box section gate. The gate to which the lock is fitted is the type which swings open and closed, such that a lateral impact is occasioned when the hook hits the strike plate. Indeed, preferably, the lock of the invention is not of the espagnolette (multi-point) type. These locks are most frequently used on patio doors and windows, where the materials are usually plastics or woods and it is easy to cut full-length portions therefrom. Espagnolette locks are not suitable for use on gates, especially box section metal gates.

[0027] The lock / latch of the invention is for use in a gate that swings, i.e. a gate mounted for rotation about a hinge axis. It is not for use on a sliding door.

[0028] When the lock / latch is located in a gate and the hook is in the second position the hook can latch when the gate is swung shut, when the hook laterally impacts a strike plate. That impact causes the hook to move substantially in the plane of the gate until the hook clears the strike plate whereupon it is biased back, e.g. by a spring, into a gate keeper.

[0029] Once in the keeper, the hook can be moved (in the plane of the gate) into the third, locked position.

[0030] Preferably, the hook is approximately vertical (e.g. approximately 180 degrees in the plane of the gate or door to which it is fitted) when it is in its first lock position.

[0031] Preferably, the hook is approximately 135 degrees in the plane of the gate or door to which it is fitted when it is in its second lock position.

[0032] Preferably, the hook is approximately horizontal (e.g. approximately 90 degrees in the plane of the gate or door to which it is fitted) when it is in its third lock position.

[0033] When fitted to a gate or door, the lock of the invention provides the user with a simplified and easy-to-use alternative to those hook locks known to the skilled person. This is because the hook can function as both a latch-lock and a dead-lock.

[0034] The invention also provides a method of locking or unlocking a gate or door using the hook lock described elsewhere herein, the method comprising the step of actuating the lock mechanism to pivot the hook between

- i. a first position, in which the gate or door is free to move between open and closed positions;
- ii. a second position, in which the gate or door is latched, e.g. fastened but not dead-locked; and
- iii. a third position, in which the gate or door is dead-locked.

[0035] The method is characterized in that the hook is responsible for providing both the latched position and the dead-locked position.

[0036] The invention hence provides a hook lock capable of both latch-locking and dead-locking a door or gate.

Examples

Reference Key

[0037]

Latching Hook Lock (1)
 Gate (2)
 Hook (4)
 Latch Ramp (6)
 Handle (8)
 Key Cylinder (10)
 End Plate (12)
 Gate Post (14)
 Strike Plate (16)
 Hook Keeper (18)
 Handle Return Spring (20)
 Latch Return Spring (22)
 Main Pivot Pin (24)
 Cam (26)
 Cam Follower (28)

[0038] The invention is now illustrated in specific examples, with reference to the accompanying drawings, in which:

Fig. 1 is an exploded schematic view of a hook lock according to the invention when fitted to a gate;
 Fig. 2 is a front view of the lock of Fig. 1 fitted to a gate;
 Fig. 3 is a rear view of the lock of Fig. 1 fitted to a gate;
 Fig. 4 is the lock shown in Figs 1-3 with its hook in the latched position of a keeper in a gate post; and
 Fig. 5 is a schematic of the hook lock mechanism from the lock shown in Figs 1-4.

[0039] Figures 1-4 show a latching hook lock (1) according to the invention fitted to a box section gate rail (2). The lock (1) is inserted into a cut-out in the gate rail (2) in the absence of the Euro key cylinder (10), with the Euro key cylinder (10) being inserted afterwards through the gate rail (2) and into position via separate apertures in the gate rail (2). Front and rear plates, along with an end plate (12), are then secured to the gate rail (2), before two handles (8) are inserted through apertures in opposing sides of the gate rail (2).

[0040] The hook lock mechanism illustrated in Fig. 5 shows a hook (4) in its projected, latched position. Upon turning of either handle (8), a handle return spring (20) is compressed, which in turn allows a latch return spring (22) to compress and retract the hook (4) into an approximately vertical position (not shown). When in the substantially vertical position, the hook (4) is mostly inside the housing of the lock (1). Upon release of the handle (8), the two springs (20, 22) rebound and the handles (8) return to their resting position, which in turn rotates the hook (4) about its pivot pin (24) back into the projected, latched position. In this latched position, the hook (4) is rotated approximately 45 degrees (from its vertical, re-

tracted position) and hence the hook (4) projects out of the lock housing in a diagonal manner.

[0041] As illustrated in Fig. 4, with the handles (8) in their resting position and the gate closed, the hook (4) sits in a keeper (18) inside a gate post (14). If the handle (8) is turned to allow the gate (1) to open and then the handle (8) is released, the gate will swing closed. Upon entry of the hook (4) into its keeper (18), the hook (4) first contacts a strike plate (16) and is retracted slightly as the hook (4) passes over the strike plate (16) and into its keeper (18).

[0042] In order to ensure minimal damage to the lock mechanism resulting from the hook (4) laterally impacting the strike plate (16), the hook is provided with a brass latch ramp (6) at its distal end. The rounded surface of the latch ramp (6) allows for reduced friction upon contact of the hook (4) with the strike plate (16). The strike plate (16) is also angled to reduce friction and assist movement of the hook (4) into its keeper (18).

[0043] Upon turning of a key in the Euro cylinder (10), a cam (not shown) on the cylinder (10) moves a cam follower (28) which in turn rotates the hook (4) into a substantially horizontal, dead-locked position (not shown). In doing so, the latch return spring (22) is stretched to allow further projection of the hook (4). When in the dead-locked position, the hook (4) is rotated approximately 90 degrees (from its vertical, retracted position) and hence projects out of the lock housing in a horizontal manner.

[0044] In the dead-locked position, the hook (4) cannot be retracted by turning the handle (8). The only way to return the hook (4) to its latched position is by turning the key in the opposite direction to before.

[0045] The invention hence provides a latching hook lock.

Claims

1. A hook lock mechanism, comprising a hook which pivots about an axis, **characterized in that** the hook is movable between at least a position in which it is locked and can act as a dead bolt for a swing gate lock and a position in which it is not locked but can act as a latch bolt for a swing gate lock, wherein the mechanism is cylinder-operated.
2. A hook lock mechanism according to claim 1, wherein the hook comprises a latch ramp at its distal end.
3. A hook lock mechanism according to claim 2, wherein the latch ramp has a rounded and/or bevelled surface for contacting a strike plate on the swing gate.
4. A hook lock mechanism according to any preceding claim, wherein the hook is moveable between three main positions:

- i. a first position, wherein it is retracted from a keeper;
 - ii. a second position, wherein it is latched, e.g. freely able to move back into the first position; and
 - iii. a third position, wherein it is locked, e.g. unable to freely move back into its first or second positions.
- 5. A hook lock mechanism according to claim 4, wherein, in the first position, the hook is biased (e.g. by a spring) towards its second position. 10
- 6. A hook lock mechanism according to any preceding claim, wherein the mechanism is actuated by a key. 15
- 7. A lock for a swing gate comprising a hook lock mechanism according to any preceding claim, wherein the hook provides three main lock positions about its axis: 20
 - i. a first lock position, wherein the swing gate is free to move between open and closed positions;
 - ii. a second lock position, wherein the swing gate is latched, e.g. fastened but not dead-locked; and 25
 - iii. a third lock position, wherein the swing gate is dead-locked. 30
- 8. A lock according to claim 7, wherein the lock is not of the espagnolette type.
- 9. A lock according to claim 7 or 8, wherein the swing gate is of the box-section type. 35
- 10. A lock according to any of claims 7-9, wherein, in the first lock position, the hook is approximately vertical.
- 11. A lock according to any of claims 7-10, wherein, in the third lock position, the hook is approximately horizontal. 40
- 12. A lock according to any of claims 7-11, wherein, in the second lock position, the hook is located in between the positions of the hook in its first and third lock positions. 45
- 13. A method of locking or unlocking a swing gate, comprising the step of actuating a cylinder-operated lock mechanism that pivots a hook between 50
 - i. a first position, in which the swing gate is free to move between open and closed positions;
 - ii. a second position, in which the swing gate is latched, e.g. fastened but not dead-locked; and 55
 - iii. a third position, in which the swing gate is dead-locked,

characterized in that the hook is responsible for providing both the latched position and the dead-locked position.

- 5 14. A method according to claim 13, wherein the hook comprises a latch ramp at a distal end thereof, in order to facilitate movement over a strike plate when the gate is swung shut and the hook is in its second position.
- 15. A method according to claim 14, wherein the latch ramp has a rounded and/or bevelled surface for contacting the strike plate.

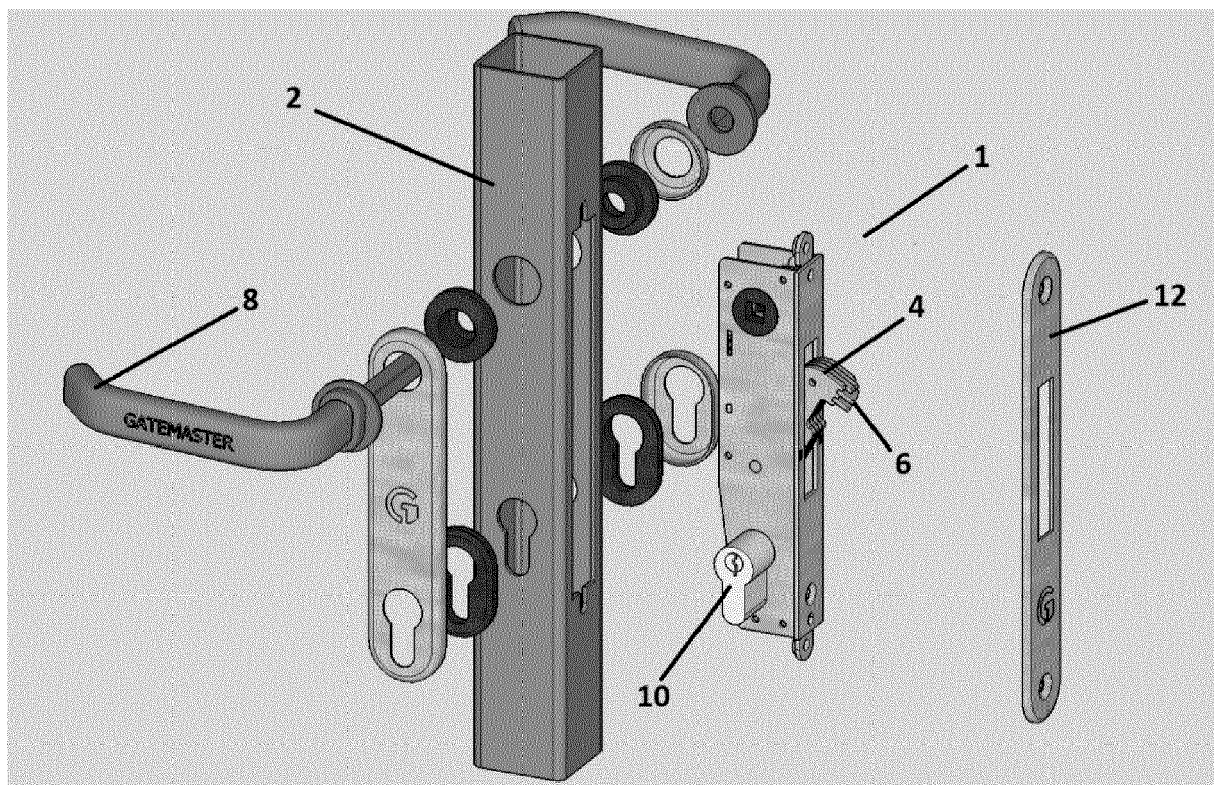


Fig. 1

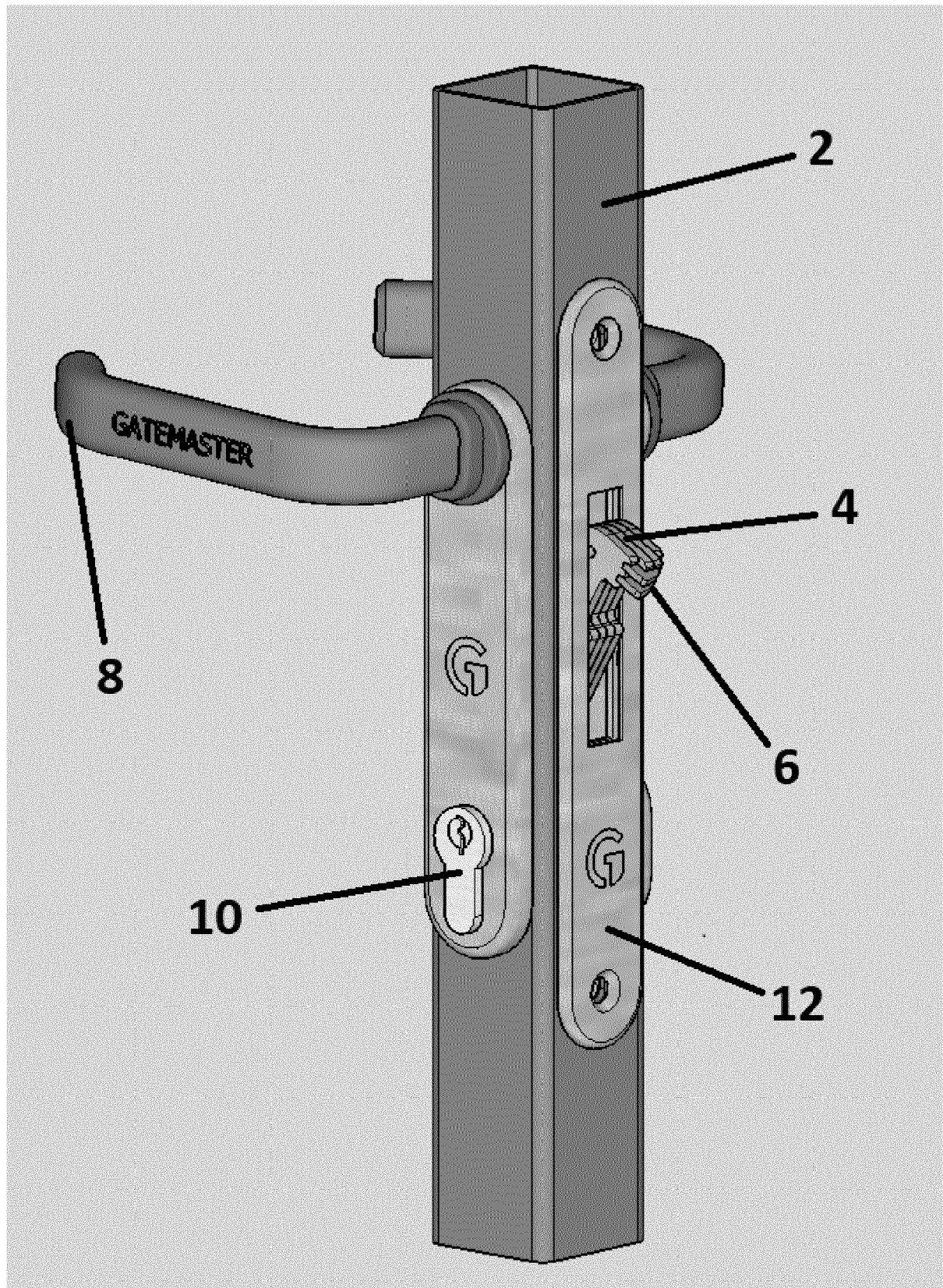


Fig. 2

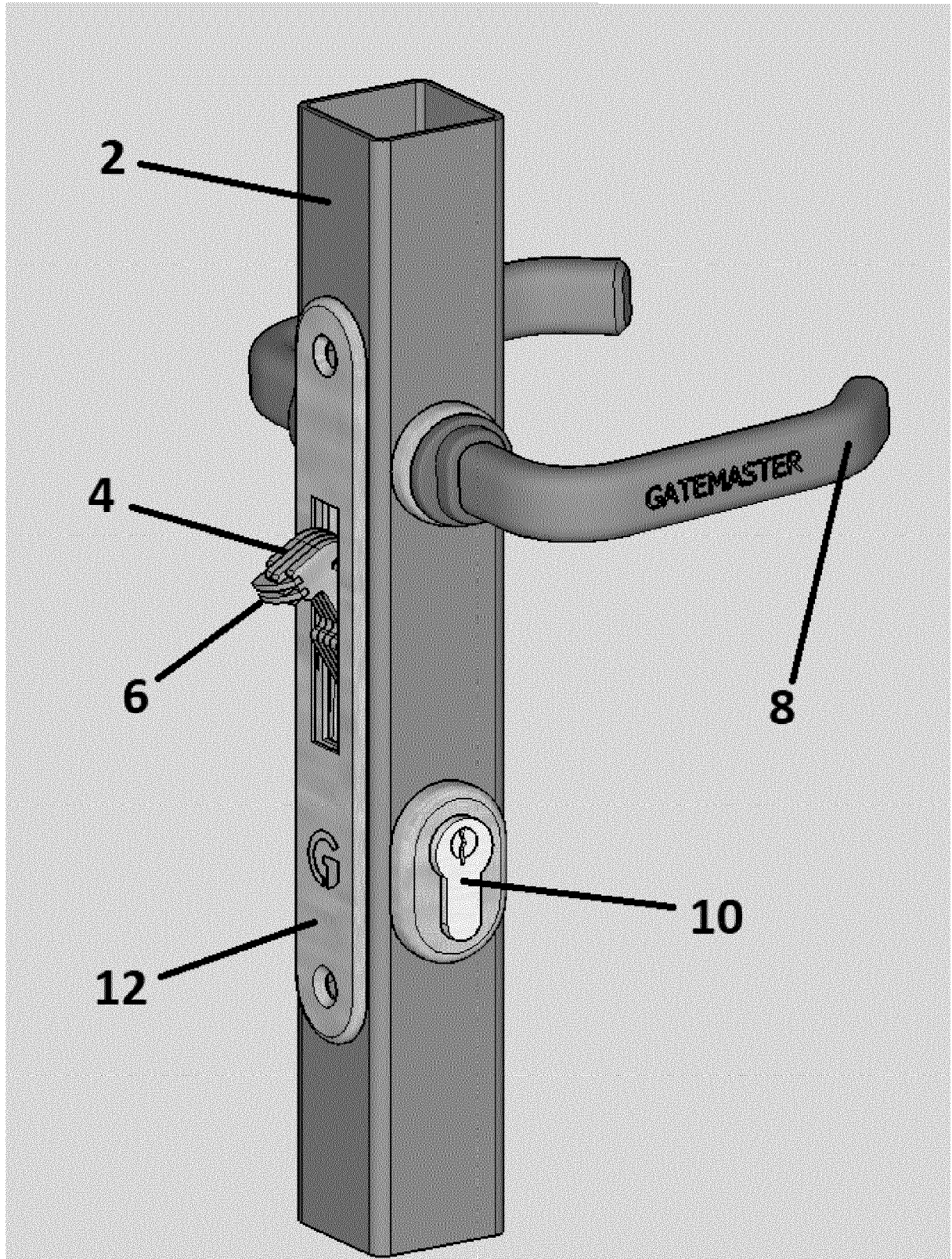


Fig. 3

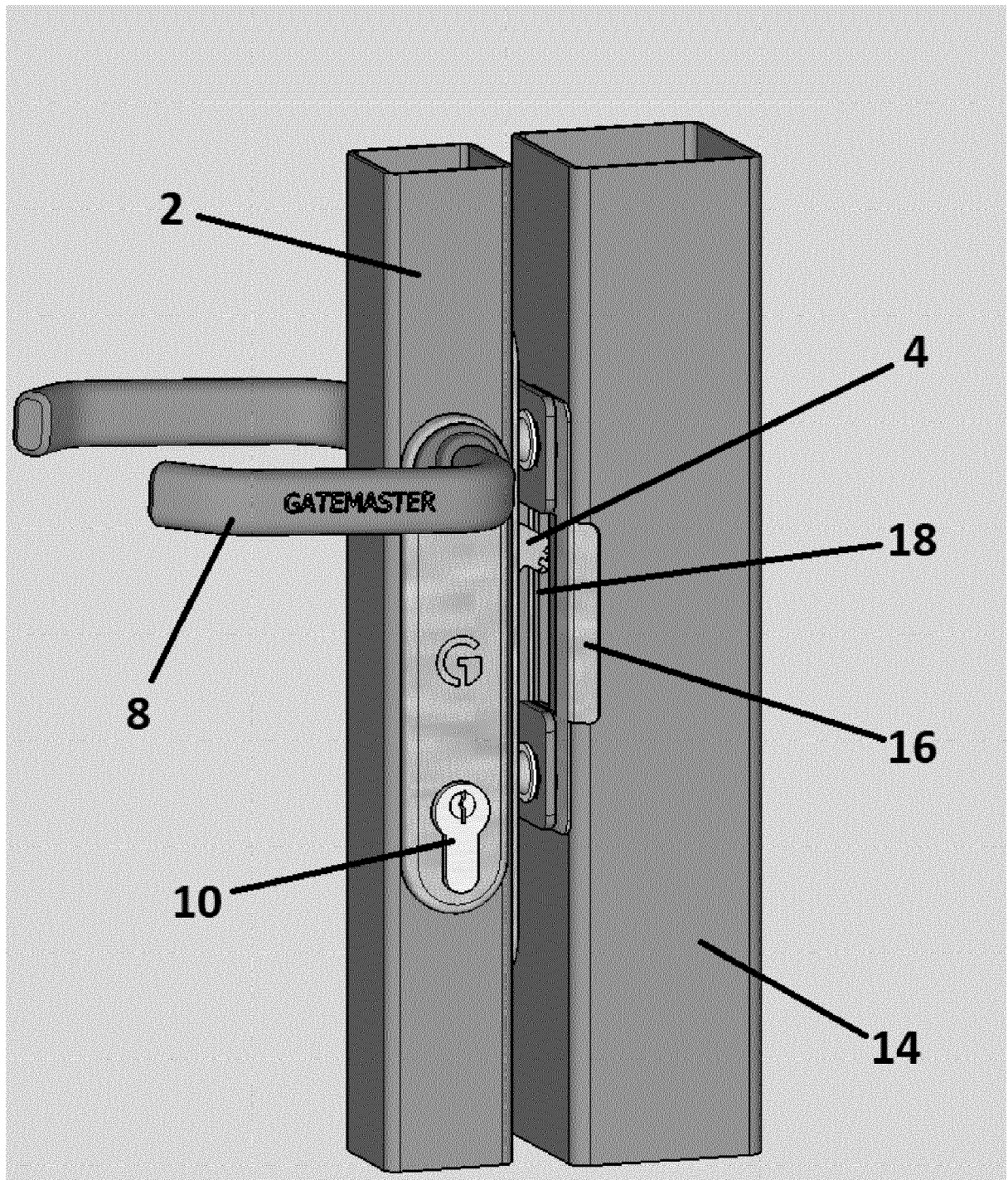


Fig. 4

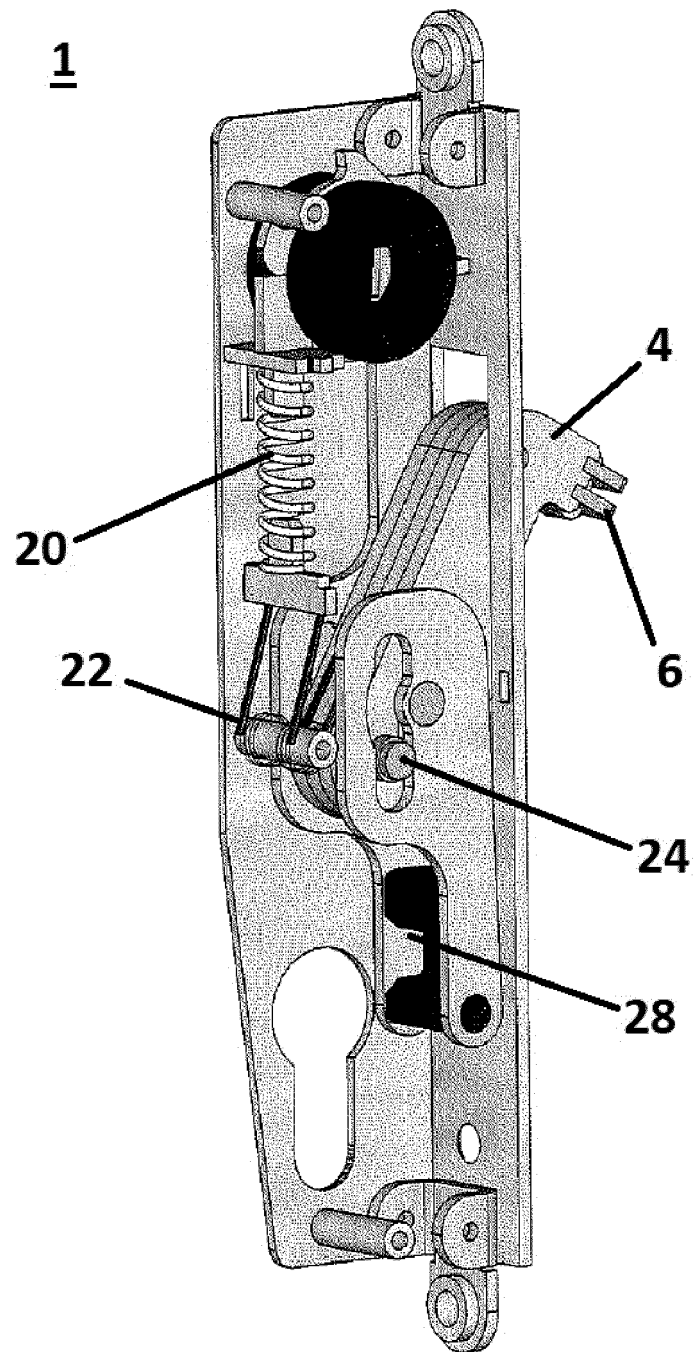


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 21 17 2080

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 September 2021	Examiner Koster, Michael
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			

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

EP 21 17 2080

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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22-09-2021

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REFERENCES CITED IN THE DESCRIPTION

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