

- (51) International Patent Classification:
E05F 15/681 (2015.01) E05F 15/686 (2015.01)
- (21) International Application Number:
PCT/EP2024/068193
- (22) International Filing Date:
27 June 2024 (27.06.2024)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
2330304-3 29 June 2023 (29.06.2023) SE
- (71) Applicant: ASSA ABLOY ENTRANCE SYSTEMS AB
[SE/SE]; Box 131, 261 22 LANDSKRONA (SE).
- (72) Inventor: PENATO, Edoardo; Via Raffaello 271, 21040
Cislago (IT).
- (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, CV, CZ, DE, DJ, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG,
KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY,
MA, MD, MG, MK, MN, MU, 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, ST, SV, SY, TH,
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS,
ZA, ZM, ZW.

- (84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, CV,
GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, 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, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE,
SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,
GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: ANTI-THEFT TROLLEY PROTECTOR FOR A GARAGE DOOR OPENER

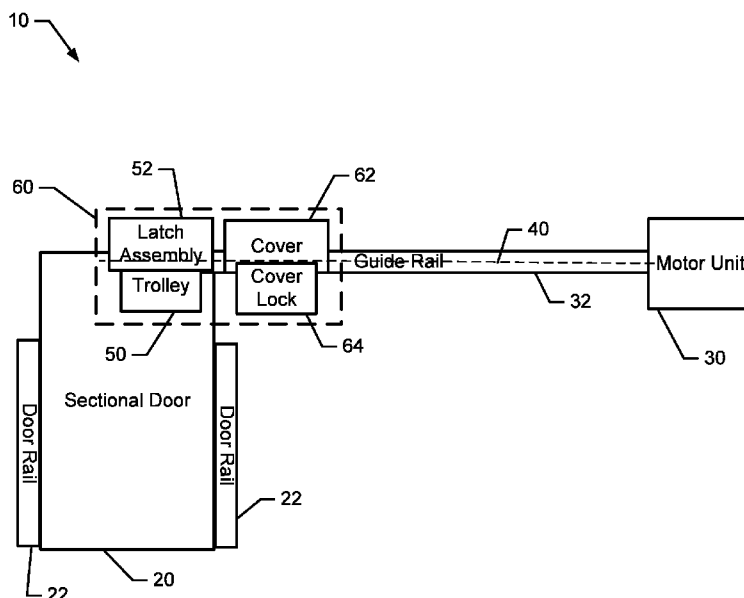


FIG. 1.

(57) Abstract: An intrusion resistant trolley assembly for a GDO in a ceiling mounted configuration may include a trolley operably coupled to a guide rail to be movable relative to the guide rail based on corresponding movement of a flexible conveyance member when selectively operably coupled to the flexible conveyance member, a latch assembly operable to alternately engage the trolley to the flexible conveyance member and disengage the trolley from the flexible conveyance member, and a cover having an opened position in which the latch assembly is accessible for operation and a closed position in which the latch assembly is not accessible and cannot be operated.

Published:

- *with international search report (Art. 21(3))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*

ANTI-THEFT TROLLEY PROTECTOR FOR A GARAGE DOOR OPENER

TECHNICAL FIELD

Example embodiments generally relate to garage door operators (GDOs) and, in particular, relate to a release system for a GDO having a trolley protector that prevents external actors from disconnecting the trolley and gaining access to the garage.

BACKGROUND

A large portion of sectional garage doors for both residential and industrial applications employ an installed GDO to automatically open and close the garage doors. One solution for mounting and operating these GDOs is to mount the GDO from the ceiling proximate to the garage door. For such ceiling mounted GDOs, a ceiling mounted linear force operator drags one of the connected sections of the sectional door through the guide rails the door rides in as the sectional door transitions between opened and closed positions.

A problem that can occur in relation to these ceiling mounted GDOs is that they may be exploited to affect a break-in by a thief or burglar. In general, the ceiling mounted GDO does not have any locking system integrated therewith, because the mechanical components that comprise it, and their mechanical connections, are not reversible except through the automated operation of the GDO. However, the connection of the GDO to the sectional door is typically accomplished by providing a trolley, which rides on its own reversible path associated with opened and closed positions of the sectional door, to carry and drag the door. The trolley is selectively attached to and detached from a flexible conveyance member (e.g., a chain, cable, rope, belt, etc.) that is directly attached to the GDO and which, when the GDO operates, is conveyed along a path to drag the sectional door between opened and closed positions when the trolley is connected thereto. The trolley's selective connection to the flexible conveyance member is the typical target for the thief or burglar.

In this regard, for example, the burglar would typically attempt to disengage the trolley via reaching over the sectional door (through a small gap above the door) to reach a rope or latch that releases the trolley from the flexible conveyance member. Once reached, the rope or latch may be grasped and operated to disengage the trolley, thereby leaving the door to be manually opened

(lifted) by the burglar. This mode of break-in may be prevented by separate locks that may be manually inserted through the guide rails to prevent movement of the door. However, operation of these manual locks may also be considered to be a hassle by some operators. Thus, it may be desirable to find a better solution.

BRIEF SUMMARY OF SOME EXAMPLES

In an example embodiment, an intrusion resistant trolley assembly for a GDO in a ceiling mounted configuration may be provided. The assembly may include a trolley operably coupled to a guide rail to be movable relative to the guide rail based on corresponding movement of a flexible conveyance member when selectively operably coupled to the flexible conveyance member, a latch assembly operable to alternately engage the trolley to the flexible conveyance member and disengage the trolley from the flexible conveyance member, and a cover having an opened position in which the latch assembly is accessible for operation and a closed position in which the latch assembly is not accessible and cannot be operated.

In another example embodiment, a GDO system for a ceiling mounted GDO may be provided. The system may include a sectional door movable on rails between a door open state and a door closed state, a GDO motor operable to provide power for movement of the sectional door between the open and closed positions via moving a flexible conveyance member, an intrusion resistant trolley assembly, and an arm operably coupled at opposing ends thereof to a garage door and the intrusion resistant trolley assembly, respectively. The intrusion resistant trolley assembly may include a trolley operably coupled to a guide rail to be movable relative to the guide rail based on corresponding movement of a flexible conveyance member when selectively operably coupled to the flexible conveyance member, a latch assembly operable to alternately engage the trolley to the flexible conveyance member and disengage the trolley from the flexible conveyance member, and a cover having an opened position in which the latch assembly is accessible for operation and a closed position in which the latch assembly is not accessible and cannot be operated.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

Having thus described some example embodiments in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

FIG. 1 illustrates a block diagram of a GDO system in accordance with an example embodiment;

FIG. 2 illustrates a perspective view of some example components associated with a GDO system in accordance with an example embodiment;

FIG. 3 illustrates a side view of an intrusion resistant trolley assembly according to an example embodiment;

FIG. 4 shows a perspective view of the intrusion resistant trolley assembly of FIG. 3 with the cover of the intrusion resistant trolley assembly in a closed position according to an example embodiment;

FIG. 5 shows a perspective view of the intrusion resistant trolley assembly of FIG. 3 with the cover of the intrusion resistant trolley assembly removed according to an example embodiment

FIG. 6 shows a perspective view of an inside of the cover of the intrusion resistant trolley assembly according to an example embodiment;

FIG. 7 illustrates the intrusion resistant trolley assembly of FIG. 5 with the guide rail removed in accordance with an example embodiment;

FIG. 8A illustrates an isolated perspective view of a cover lock in a locked state in accordance with an example embodiment; and

FIG. 8B illustrates an isolated perspective view of the cover lock in an unlocked state in accordance with an example embodiment.

DETAILED DESCRIPTION

Some example embodiments now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all example embodiments are shown. Indeed, the examples described and pictured herein should not be construed as being limiting as to the scope, applicability or configuration of the present disclosure. Rather, these example embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like reference numerals refer to like elements throughout. Furthermore, as used herein, the term “or” is to be interpreted as a logical operator that results in true whenever one or more of its operands are true. As used herein, operable coupling should be understood to relate to direct or indirect connection that, in either case, enables functional interconnection of components that are operably coupled to each other.

As indicated above, it may be desirable to provide an intrusion resistant trolley assembly for the GDO in order to prevent break-in attempts through trolley disengagement. FIG. 1 illustrates a block diagram of a GDO system 10 of an example embodiment. In this regard, the GDO system 10 includes a sectional door 20 that is mounted on door rails 22. The GDO system 10 also includes a motor unit 30 (or head unit) that is operably coupled to a guide rail 32. The guide rail 32 supports a flexible conveyance member 40 that is operably coupled to the sectional door 20 via a trolley 50 that is selectively attachable and detachable to the flexible conveyance member 40 via a latch assembly 52. The latch assembly 52 is actuated to disengage (or detach) the trolley from the flexible conveyance member 40.

Example embodiments further provide an intrusion resistant trolley assembly 60 including a cover 62 that is operably coupled to the trolley, and prevents access to the latch assembly 52, thereby rendering it impossible to access the latch assembly 52 and disengage the trolley 50 unless the cover 62 is removed or repositioned. In some cases, the latch assembly 52 may include a latch (e.g., a shaft or pin that is attached to a spring loaded lever to be inserted into a catch member in the flexible conveyance member 40), and a lanyard or cord. The point of the intrusion resistant trolley assembly 60 is to provide a structure that prevents access to operation of the latch assembly 52 (e.g., by preventing access to the latch and the lanyard). Example embodiments may further add a cover lock 64 that must be operated to enable the cover to be removed or repositioned. When the cover 62 is installed over the trolley 50, and the cover lock 64 is further actuated, the attempts of a burglar or thief to obtain entry via the mechanism described above is not possible. FIGS. 2-8 show some example components and structures that may be used to implement example embodiments in some cases.

In this regard, FIG. 2 shows a GDO system 110 that is one example of the GDO system 10 of FIG. 1. The GDO system 110 includes a sectional door 120, in which each section of the door has rollers 112 operably coupled to opposing lateral sides of each section. The rollers 112 ride in door rails 122 disposed on opposing sides of the sectional door 120 as the sectional door 120 transitions between opened and closed positions. The sectional door 120 of FIG. 1 is shown in the closed position, where the rollers 112 are in a vertical section of the door rails 122. Thus, it can be appreciated that in the opened position the rollers 112 are located in a horizontally extending portion of the door rails 122.

FIG. 2 also illustrates a motor unit 130 of the GDO system 110, which may be referred to as an opener or head unit in some cases. The motor unit 130 of this example may be mounted (e.g., from the ceiling) proximate to an end of a guide rail 132 to drive a trolley 150 (partially visible in FIG. 4) along the guide rail 132 via a flexible conveyance member 140 (e.g., a belt, cable or chain). The flexible conveyance member 140 may also be operably coupled (e.g., via the trolley) to a top portion of the sectional door 120 via an arm 170. As noted above, the trolley 150 may be manually released from the sectional door 120 to allow for manual repositioning of the sectional door 120. However, the trolley 150 is protected by a intrusion resistant trolley assembly 160 of an example embodiment, which is effectively an anti-burglary device that prevents illicit operation of the latch assembly 152 (see FIG. 5) of the trolley 150.

FIG. 3 illustrates a side view of a portion of the GDO system 110 of FIG. 2 in greater detail. In this regard, FIG. 3 illustrates the intrusion resistant trolley assembly 160, the arm 170, which is operably coupled at one end thereof to the intrusion resistant trolley assembly 160, and the guide rail 132 discussed above. The opposite end of the arm 170 is attached to the sectional door 120 of FIG. 2. The intrusion resistant trolley assembly 160 in this view can be further seen to include cover 162 and cover lock 164, which are more clearly seen in FIG. 4, which is a perspective view of the intrusion resistant trolley assembly 160 of FIG. 3 in greater detail. Meanwhile, FIG. 5 removes the cover 162 to better show components under the cover 162, and the cover 162 is shown in isolation in FIG. 6. The guide rail 132 is removed in FIG. 7 to better reveal aspects of the trolley 150. Meanwhile FIG. 8 illustrates the cover lock 164 transitioning between locked and unlocked positions.

As can be seen in FIGS. 3-5 and 7, the arm 170 may be attached to the trolley 150 via a pin 172. The pin 172 may also serve to pivotally attach the cover 162 to the trolley 150. In this regard, the trolley 150 may include a clevis 200 that may be attached to the trolley 150, and into which a portion of the arm 170 may be passed. The portion of the arm 170 that is inserted into the clevis 200 may include a slot through which the pin 172 may pass. In some cases, the pin 172 may further be provided with a retention or cotter pin 202 that may require removal before the pin 172 can be removed from the clevis 200 to physically disconnect the trolley 150 from the sectional door 110 (via disconnection of the trolley 150 from the arm 170).

Turning primarily to FIG. 6, the cover 162 may be substantially rectangular prismatic in shape. However, the cover 162 may be fully open on one side thereof (the side that faces the trolley 150).

Other sides may be fully or partially covered with sidewalls, which include lateral sidewalls 210, a main body portion 212, a proximal end sidewall 214, and a distal end sidewall 216. The lateral sidewalls 210 extend perpendicularly away from opposing lateral edges of the main body portion 212. The proximal end sidewall 214 is closest to the arm 170, and the distal end sidewall 216 is disposed at an opposite end of the main body portion 212 with respect to the proximal end sidewall 214. Both the proximal end sidewall 214 and the distal end sidewall 216 extend perpendicularly away from opposing longitudinal edges of the main body portion 212.

To receive the pin 172, and thereby pivotally operably couple the cover 162 to the trolley 150, the cover 162 may include reception slots 220. The reception slots 220 in this example may be formed in corresponding portions of the lateral sidewalls 210 that are proximate to the proximal end sidewall 214. The main body portion 212 may also include an arm slot 230 formed near the proximal end sidewall 214 to receive the arm 170 and allow the cover 162 to pivot relative to the trolley 150 when transitioning from the closed position (shown in solid lines in FIG. 3) and an opened position 240 (shown in dashed lines in FIG. 3). The main body portion 212 also includes a cover lock access 250. In this example, the cover lock 164 extends partially through the cover lock access 250. However, it may alternatively be the case that the cover lock 164 is merely accessible through the cover lock access 250.

Notably, the latch assembly 152 of FIG. 2 may take numerous forms. Thus, in FIG. 5, the latch assembly 152 is depicted amorphously in dashed lines as latch assembly 152. A cord or lanyard 192 is also amorphously represented in FIG. 5 attached to the latch assembly 152 for tugging or pulling in order to actuate or operate the latch assembly 152. When in the closed position, the cover 162 may effectively restrict access to the latch assembly 152 (and the lanyard 292) of the trolley 150. In this regard, the cover 162 may effectively restrict access to the latch assembly 152 (and the lanyard 292) from all sides due to the confinement of the latch assembly 152 (and the lanyard 292) inside a containment space formed by the main body portion 212, the lateral sidewalls 210, and the proximal end sidewall 214 and distal end sidewall 216. When the cover 162 is in the closed position, the arm slot 230 may be the only opening into the containment space that is not fully covered, and the arm slot 230 may in any case be too small for any implement or tool to be used to access the latch assembly 152 (and the lanyard 292). In cases where the latch assembly 152 includes the lanyard 292 (e.g., a cord, rope or other extendable member to enhance the operator's ability to reach and operate the latch assembly 152), the containment space (and

particularly the provision of the structure of the cover 162 to facilitate provision of the containment space) may be large enough to store the extendable member (e.g., the lanyard 292) within the containment space. The ability to store the entirety of the extendable member may be useful in ensuring no part dangles free for grasping by a thief or burglar attempting illicit entry into the garage.

The cover lock 164 can be seen in greater detail in FIGS. 5, 7 and 8. In this regard, FIG. 8, which is defined by FIGS. 8A and 8B, illustrates a transition of the cover lock 164 from a locked state (shown in FIG. 8A) to an unlocked state (shown in FIG. 8B). The locked state is also the state in which the cover lock 164 is depicted in FIGS. 5 and 7. In an example embodiment, a catch assembly 320 may be provided to be alternatively engaged or disengaged in order to transition the cover lock 164 between the locked state and the unlocked state. The catch assembly 320 of this example is a piece of sheet metal that is attached in a fixed manner (e.g., via screws 322) to the trolley 150. In particular, the catch member 320 may include a base portion 324 that is attached to a surface of the trolley 150 via the screws 322, and a stem portion 326 that extends perpendicularly away from the base portion 324. The catch member 320 may further include an engagement edge 328 that is cantilevered with respect to the stem portion 326 and therefore the engagement edge 328 may be in a plane perpendicular to the stem portion 326 (and consequently the engagement edge 328 may be parallel to the base portion 324).

The cover lock 164 may also include a rotatable pivot arm 330 that alternately engages the catch assembly 320 (and more particularly the engagement edge 328) in the locked state and disengages the catch assembly 320 in the unlocked state. In this regard, the pivot arm 330 may rotate or pivot in the direction of arrow 340 to transition from the locked state 300 to the unlocked state. More particularly, when in the locked state of FIG. 8A, the pivot arm 330 may be rotated behind the engagement edge 328 and be prevented from falling due to gravity from the closed position (shown in solid lines in FIG. 3) and the opened position 240 (shown in dashed lines in FIG. 3). However, when in the unlocked state of FIG. 8B, the pivot arm 330 may be rotated out of alignment with the engagement edge 328 and be permitted to fall due to gravity from the closed position (shown in solid lines in FIG. 3) to the opened position 240 (shown in dashed lines in FIG. 3). In some cases, the pivot arm 330 may include a key feature 350 into which a key may be inserted in order to permit rotation of the pivot arm 330. Thus, for example, the pivot arm 330 may not be rotatable unless the key is inserted into the key feature 350. When inserted, the key may be used to turn the

pivot arm 330 in the direction of arrow 340 to unlock the cover lock 164, or in a direction opposite the direction of arrow 340 to lock the cover lock 164.

Accordingly, some example embodiments may provide an intrusion resistant trolley assembly for a GDO in a ceiling mounted configuration. The assembly may include a trolley operably coupled to a guide rail to be movable relative to the guide rail based on corresponding movement of a flexible conveyance member when selectively operably coupled to the flexible conveyance member, a latch assembly operable to alternately engage the trolley to the flexible conveyance member and disengage the trolley from the flexible conveyance member, and a cover having an opened position in which the latch assembly is accessible for operation and a closed position in which the latch assembly is not accessible and cannot be operated. The assembly may be part of a system including a sectional door movable on rails between a door open state and a door closed state, a GDO motor operable to provide power for movement of the sectional door between the open and closed positions via moving a flexible conveyance member, and an arm operably coupled at opposing ends thereof to a garage door and the intrusion resistant trolley assembly, respectively.

The assembly and/or a system including the same, or components thereof described above may be augmented or modified by altering individual features mentioned above or adding optional features. The augmentations or modifications may be performed in any combination and in any order. For example, in some cases, the assembly/system may further include a cover lock defining a locked state in which the cover is retained in the closed position, and an unlocked state in which the cover is enabled to transition to the opened position. In an example embodiment, a catch assembly may be mounted to the trolley, and the cover lock may include a pivot arm that engages the catch assembly in the locked state and does not engage the catch assembly in the unlocked state. In some cases, the cover lock may include a key feature operable via a key to rotate the pivot arm between the locked state and the unlocked state. In an example embodiment, the catch assembly may include a base portion mounted to the trolley and extending parallel to a surface of the trolley, a stem portion extending perpendicularly away from the base portion, and an engagement edge extending parallel to the base portion to interface with the pivot arm in the locked state. In some cases, an arm may be operably coupled at opposing ends thereof to a garage door and the trolley, respectively, and the cover may be pivotally mounted to trolley via a pin, and the pin may further operably couple the arm to the trolley. In an example embodiment,

the cover may include a main body portion extending in a plane substantially parallel to a plane in which the flexible conveyance member moves. The cover may include lateral sidewalls extending perpendicularly away from the main body portion toward the trolley on opposing lateral edges of the main body portion. The cover may also include a distal end sidewall and a proximal end sidewall extending perpendicularly away from the main body portion toward the trolley on opposing longitudinal edges of the main body portion. The cover lock may be accessible through the main body portion. In some cases, distal ends of the lateral sidewalls, the proximal end sidewall and the distal end sidewall may extend away from the main body portion to be proximate to the trolley and/or the guide rail to define a containment space inside which a lanyard of the latch assembly is retained when the cover is in the closed position. In an example embodiment, the main body portion and the proximal end sidewall may include an arm slot formed therein to receive the arm responsive to the cover transitioning from the closed position to the opened position. In some cases, the cover may transition from the closed position to the opened position responsive to gravity and pivots about 70-90 degrees when transitioning from the closed position to the opened position.

Many modifications and other embodiments of the inventions set forth herein will come to mind to one skilled in the art to which these inventions pertain having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the inventions are not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Moreover, although the foregoing descriptions and the associated drawings describe exemplary embodiments in the context of certain exemplary combinations of elements and/or functions, it should be appreciated that different combinations of elements and/or functions may be provided by alternative embodiments without departing from the scope of the appended claims. In this regard, for example, different combinations of elements and/or functions than those explicitly described above are also contemplated as may be set forth in some of the appended claims. In cases where advantages, benefits or solutions to problems are described herein, it should be appreciated that such advantages, benefits and/or solutions may be applicable to some example embodiments, but not necessarily all example embodiments. Thus, any advantages, benefits or solutions described herein should not be thought of as being critical, required or essential to all embodiments or to that which is claimed herein. Although specific

terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

CLAIMS

1. An intrusion resistant trolley assembly (60, 160) for a garage door operator (GDO) in a ceiling mounted configuration, the assembly (60, 160) comprising:
 - a trolley (50, 150) operably coupled to a guide rail (32, 132) to be movable relative to the guide rail (32, 132) based on corresponding movement of a flexible conveyance member (40, 140) when selectively operably coupled to the flexible conveyance member (40, 140);
 - a latch assembly (52, 152) operable to alternately engage the trolley (50, 150) to the flexible conveyance member (40, 140) and disengage the trolley (50, 150) from the flexible conveyance member (40, 140); and
 - a cover (62, 162) having an opened position in which the latch assembly (52, 152) is accessible for operation and a closed position in which the latch assembly (52, 152) is not accessible and cannot be operated.
2. The assembly according to claim 1, further comprising a cover lock defining a locked state in which the cover is retained in the closed position, and an unlocked state in which the cover is enabled to transition to the opened position.
3. The assembly according to any of claims 1 or 2, wherein a catch assembly is mounted to the trolley, and
 - wherein the cover lock comprises a pivot arm that engages the catch assembly in the locked state and does not engage the catch assembly in the unlocked state.
4. The assembly according to claim 3, wherein the cover lock comprises a key feature operable via a key to rotate the pivot arm between the locked state and the unlocked state.
5. The assembly according to any of claims 3 or 4, wherein the catch assembly comprises a base portion mounted to the trolley and extending parallel to a surface of the trolley, a stem portion extending perpendicularly away from the base portion, and an engagement edge extending parallel to the base portion to interface with the pivot arm in the locked state.

6. The assembly according to any of the preceding claims, wherein an arm is operably coupled at opposing ends thereof to a garage door and the trolley, respectively and wherein the cover is pivotally mounted to trolley via a pin, and wherein the pin further operably couples the arm to the trolley.

7. The assembly according to any of the preceding claims, wherein the cover comprises a main body portion extending in a plane substantially parallel to a plane in which the flexible conveyance member moves,

wherein the cover comprises lateral sidewalls extending perpendicularly away from the main body portion toward the trolley on opposing lateral edges of the main body portion,

wherein the cover comprises a distal end sidewall and a proximal end sidewall extending perpendicularly away from the main body portion toward the trolley on opposing longitudinal edges of the main body portion, and

wherein the cover lock is accessible through the main body portion.

8. The assembly according to claim 7, wherein distal ends of the lateral sidewalls, the proximal end sidewall and the distal end sidewall extend away from the main body portion to be proximate to the trolley and/or the guide rail to define a containment space inside which a lanyard of the latch assembly is retained when the cover is in the closed position.

9. The assembly according to claim 7 or 8, wherein the main body portion and the proximal end sidewall include an arm slot formed therein to receive the arm responsive to the cover transitioning from the closed position to the opened position.

10. The assembly according to any of the preceding claims, wherein the cover transitions from the closed position to the opened position responsive to gravity and pivots about 70-90 degrees when transitioning from the closed position to the opened position.

11. A garage door operator (GDO) system (10, 110) comprising:
a sectional door (20, 120) movable on rails (22, 122) between a door open state and a door closed state;

a GDO motor (30, 130) operable to provide power for movement of the sectional door (20, 120) between the open and closed positions via moving a flexible conveyance member (40, 140);

an intrusion resistant trolley assembly (60, 160) for a garage door operator (GDO) in a ceiling mounted configuration; and

an arm (170) operably coupled at opposing ends thereof to a garage door and the intrusion resistant trolley assembly (60, 160), respectively;

wherein the intrusion resistant trolley assembly comprises (60, 160):

a trolley (50, 150) operably coupled to a guide rail (32, 132) to be movable relative to the guide rail (32, 132) based on corresponding movement of a flexible conveyance member (40, 140) when selectively operably coupled to the flexible conveyance member (40, 140),

a latch assembly (52, 152) operable to alternately engage the trolley (50, 150) to the flexible conveyance member (40, 140) and disengage the trolley (50, 150) from the flexible conveyance member (40, 140), and

a cover (62, 162) having an opened position in which the latch assembly (52, 152) is accessible for operation and a closed position in which the latch assembly (52, 152) is not accessible and cannot be operated.

12. The system according to claim 11, further comprising a cover lock defining a locked state in which the cover is retained in the closed position, and an unlocked state in which the cover is enabled to transition to the opened position.

13. The system according to claim 12, wherein a catch assembly is mounted to the trolley, and

wherein the cover lock comprises a pivot arm that engages the catch assembly in the locked state and does not engage the catch assembly in the unlocked state.

14. The system according to claim 13, wherein the cover lock comprises a key feature operable via a key to rotate the pivot arm between the locked state and the unlocked state.

15. The system according to claims 13 or 14, wherein the catch assembly comprises a base portion mounted to the trolley and extending parallel to a surface of the trolley, a stem portion extending perpendicularly away from the base portion, and an engagement edge extending parallel to the base portion to interface with the pivot arm in the locked state.

16. The system according to any of claims 12-15, wherein the cover is pivotally mounted to trolley via a pin, and
wherein the pin further operably couples the arm to the trolley.

17. The system according to any of claims 11-16, wherein the cover comprises a main body portion extending in a plane substantially parallel to a plane in which the flexible conveyance member moves,

wherein the cover comprises lateral sidewalls extending perpendicularly away from the main body portion toward the trolley on opposing lateral edges of the main body portion,

wherein the cover comprises a distal end sidewall and a proximal end sidewall extending perpendicularly away from the main body portion toward the trolley on opposing longitudinal edges of the main body portion, and

wherein the cover lock is accessible through the main body portion.

18. The system according to claim 17, wherein distal ends of the lateral sidewalls, the proximal end sidewall and the distal end sidewall extend away from the main body portion to be proximate to the trolley and/or the guide rail to define a containment space inside which a lanyard of the latch assembly is retained when the cover is in the closed position.

19. The system according to any of claims 17 or 18, wherein the main body portion and the proximal end sidewall include an arm slot formed therein to receive the arm responsive to the cover transitioning from the closed position to the opened position.

20. The system according to any of claims 11-19, wherein the cover transitions from the closed position to the opened position responsive to gravity and pivots about 70-90 degrees when transitioning from the closed position to the opened position.

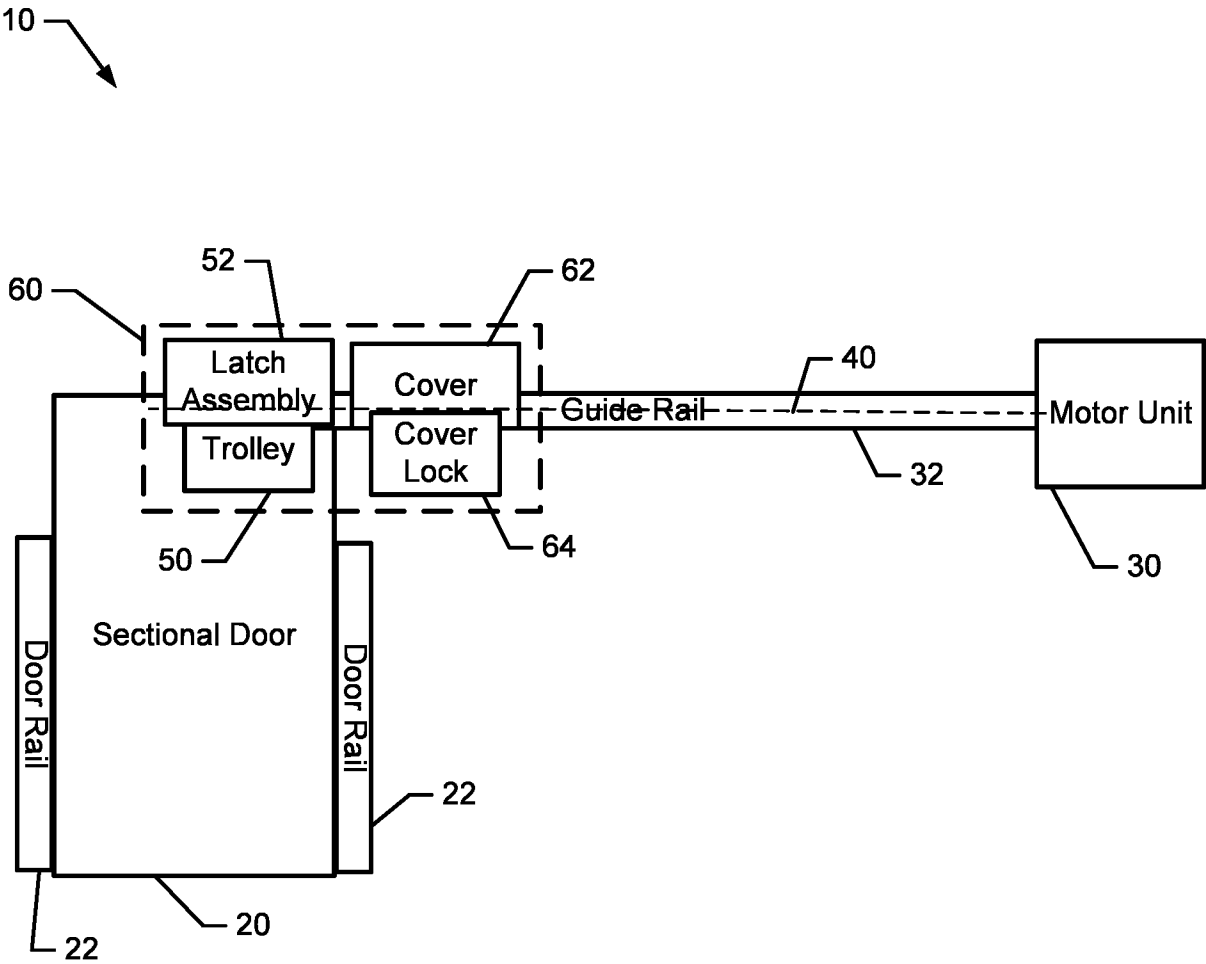


FIG. 1.

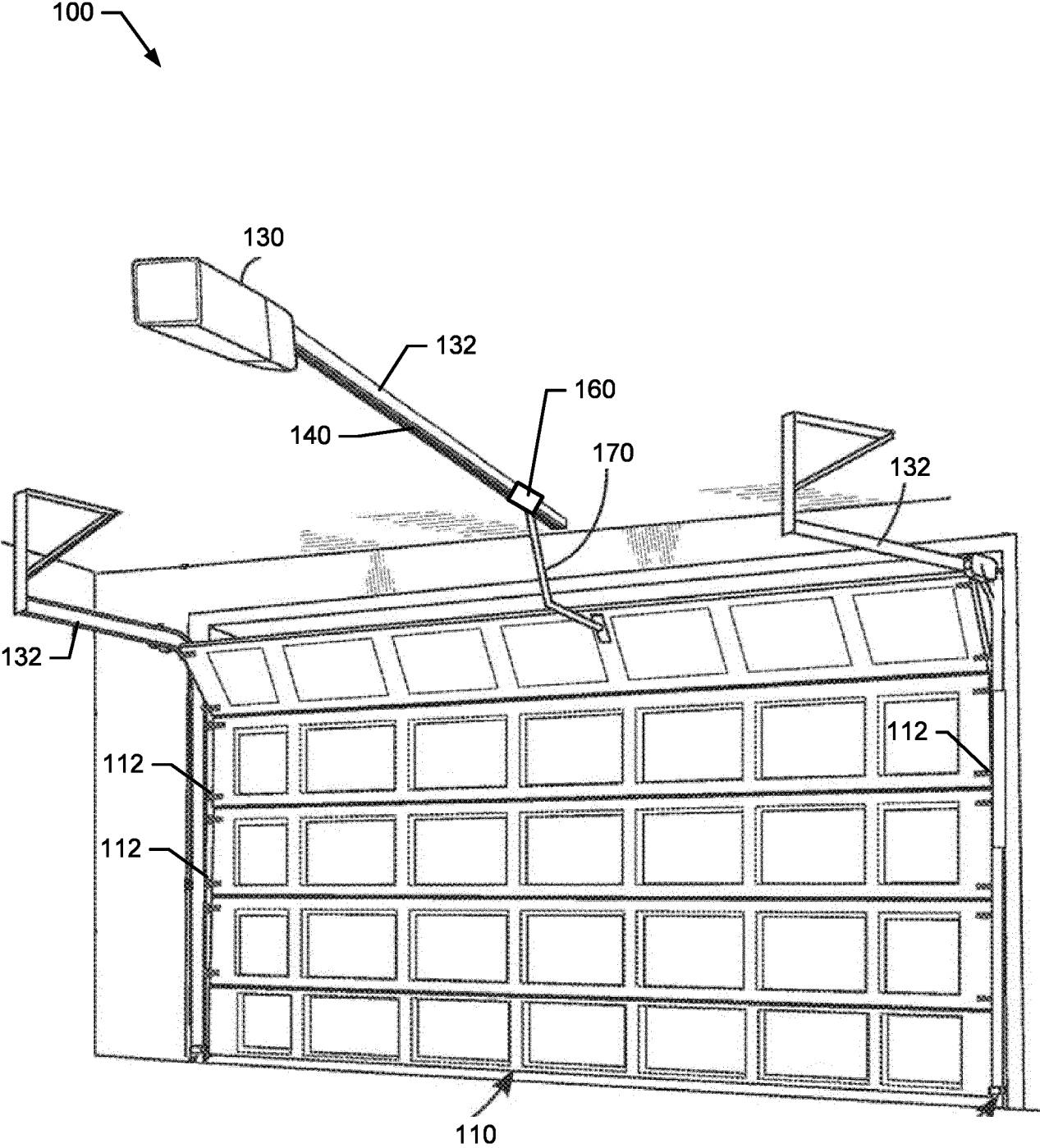


FIG. 2.

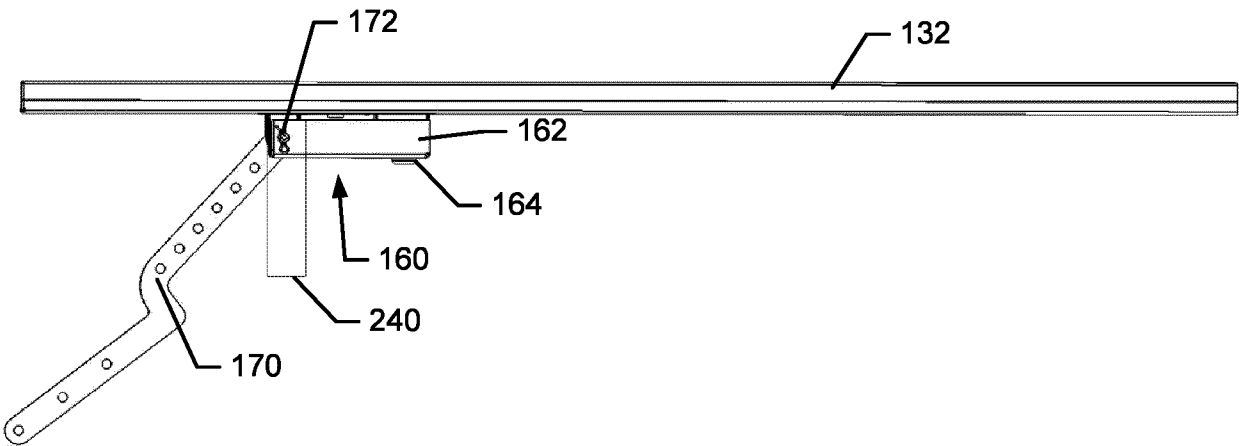


FIG. 3.

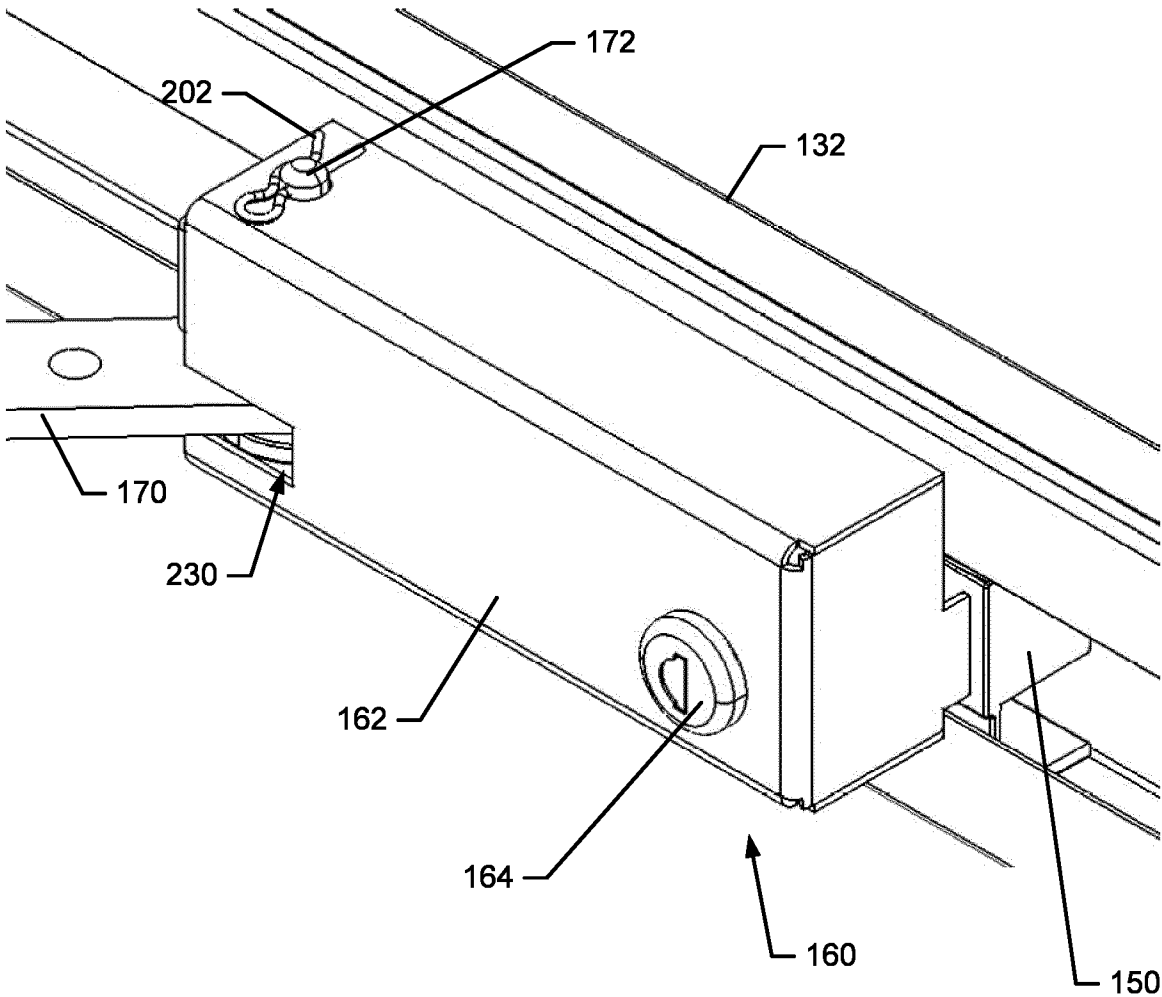


FIG. 4.

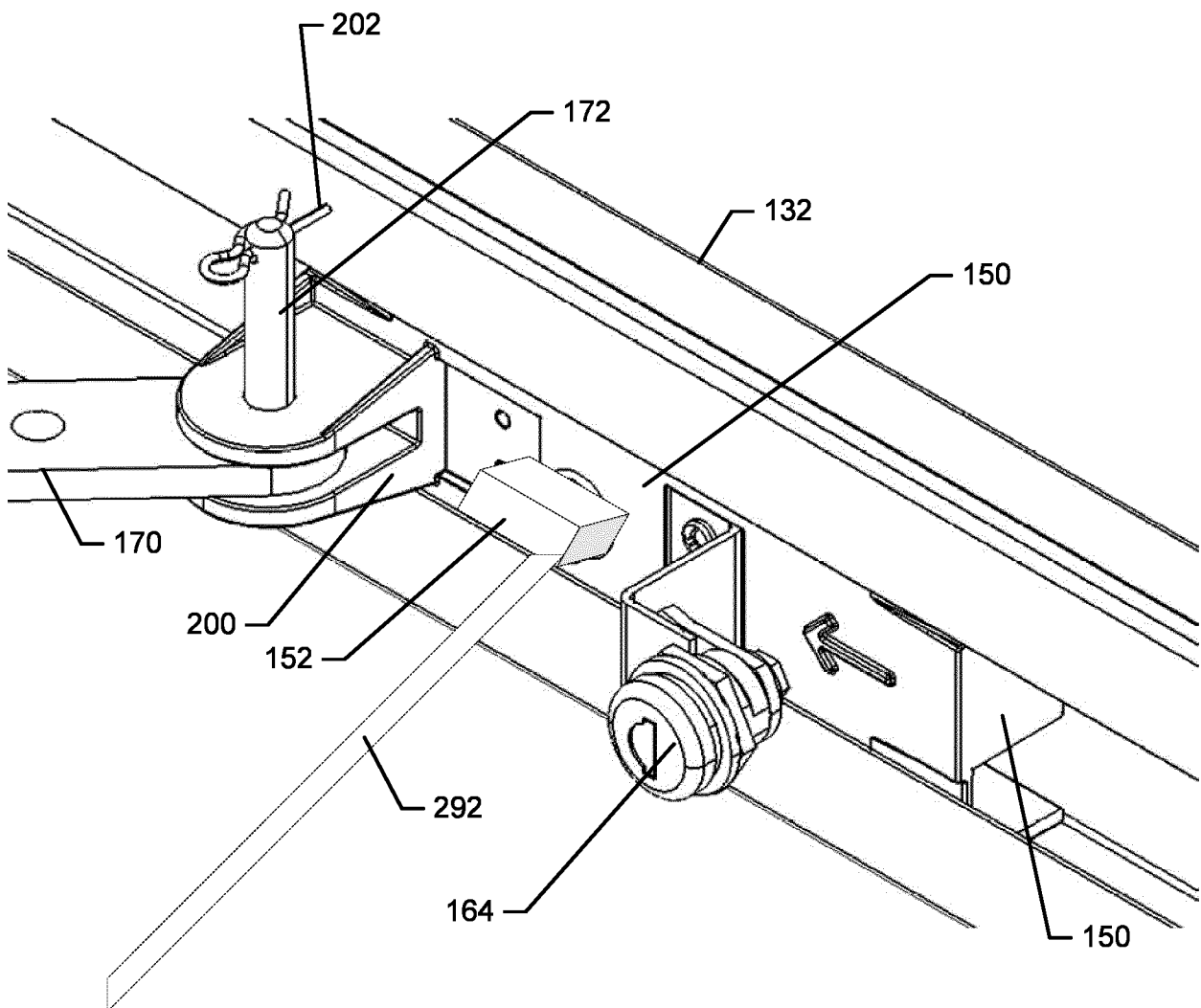


FIG. 5.

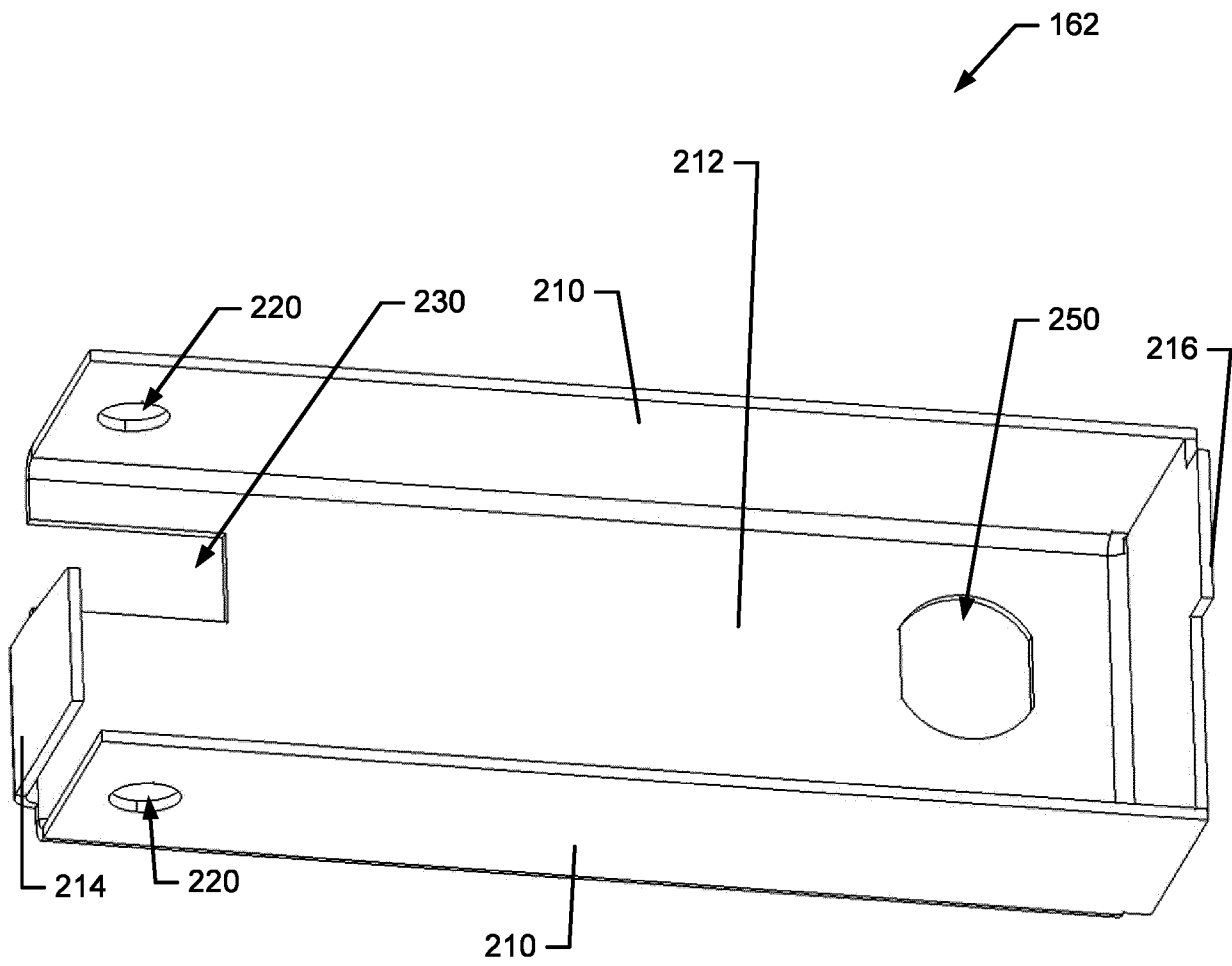


FIG. 6.

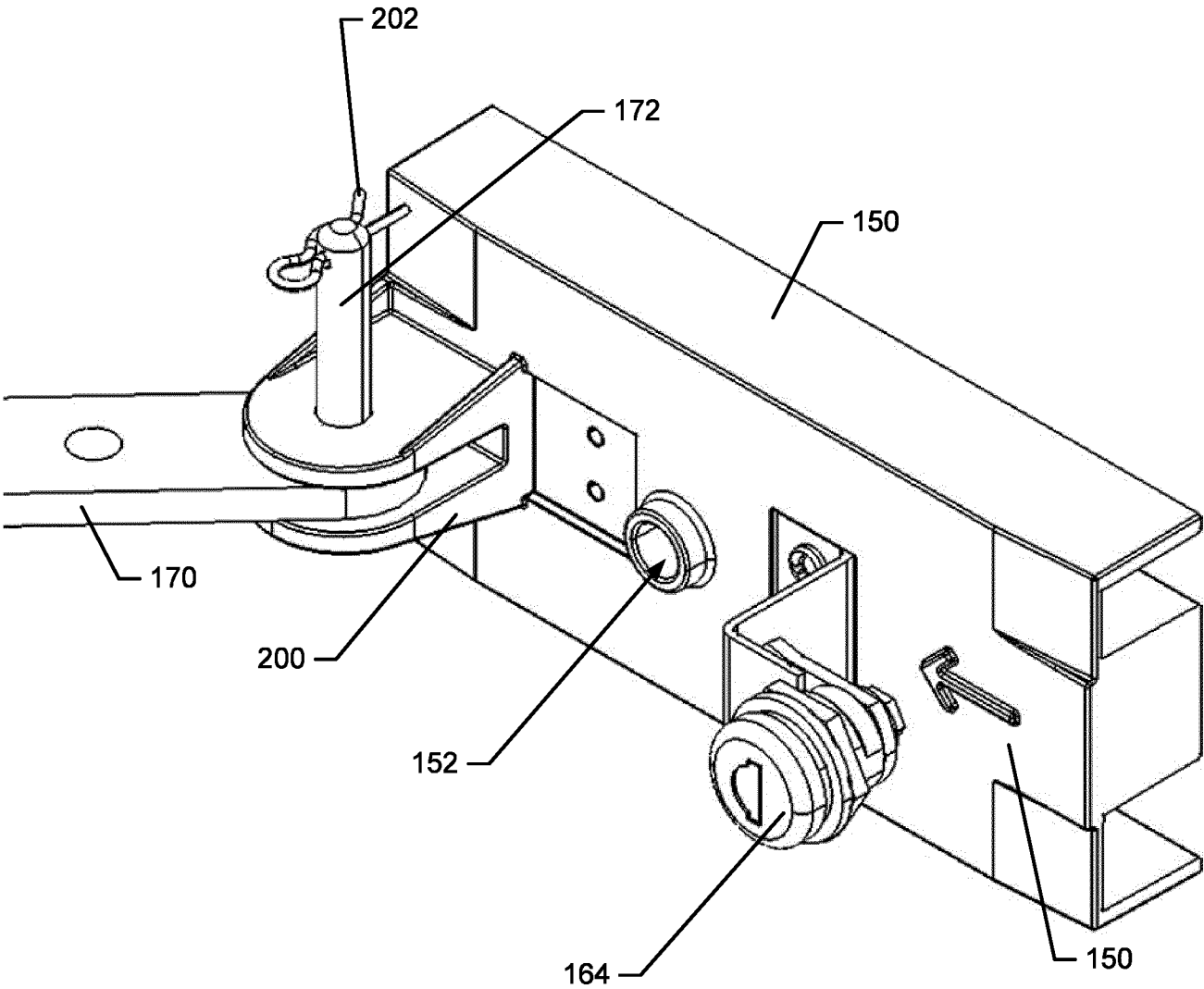
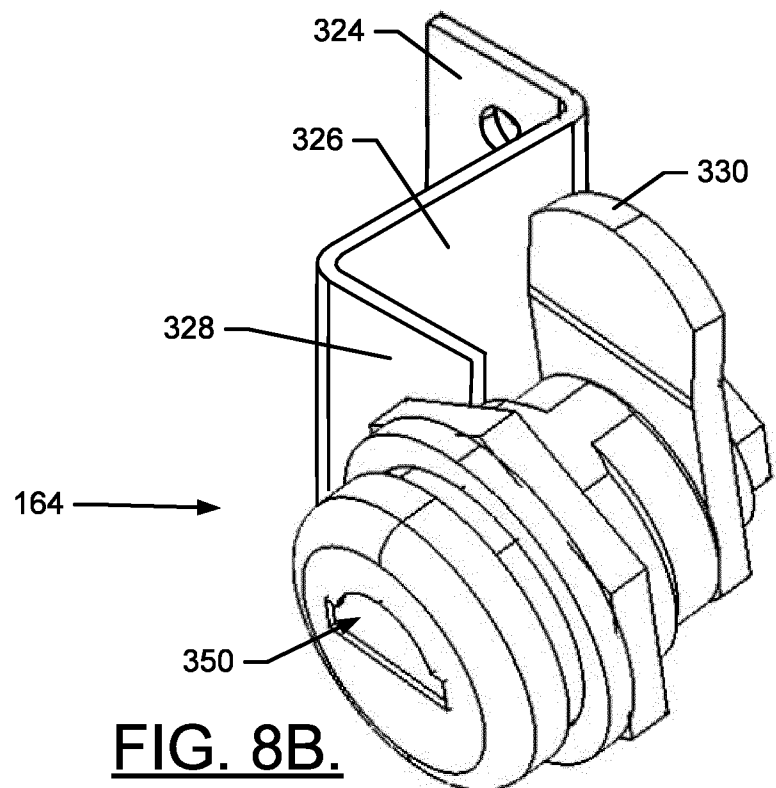
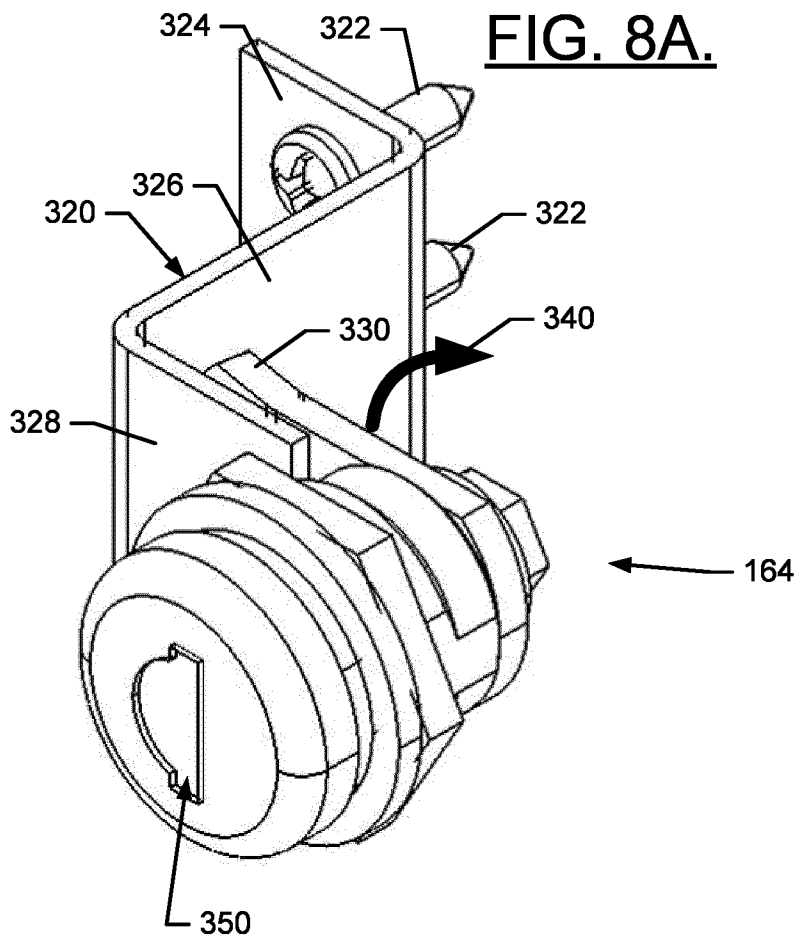


FIG. 7.



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2024/068193

A. CLASSIFICATION OF SUBJECT MATTER

INV. E05F15/681 E05F15/686

ADD.

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)

E05F

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)

EPO-Internal**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 8 936 064 B1 (DIAZ JERRY [US])	1, 11
A	20 January 2015 (2015-01-20) the whole document	2-10, 12-20
A	----- US 10 557 532 B2 (HILL HUBERT JUNIOR [US]) 11 February 2020 (2020-02-11) figures 3a-4c	1-20
A	----- US 2012/138240 A1 (WOMACKS WILLIAM [US]) 7 June 2012 (2012-06-07) figures 1-4	1-20



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

"E" earlier application or patent but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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

"&" document member of the same patent family

Date of the actual completion of the international search

12 September 2024

Date of mailing of the international search report

04/10/2024

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2

NL - 2280 HV Rijswijk

Tel. (+31-70) 340-2040,

Fax: (+31-70) 340-3016

Authorized officer

Berote, Marc

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2024/068193

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 8936064	B1	20-01-2015	NONE
US 10557532	B2	11-02-2020	NONE
US 2012138240	A1	07-06-2012	NONE