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(54) **Bi-directional espagnolette lock**

(57) An espagnolette locking mechanism for use in locking a movable leaf into a surrounding fixed frame of a window or door comprises a drive transfer mechanism (3) for connection to a rotatable handle and adapted, in use, to convert rotary movement of the handle into simultaneous translatory movement of driving elements (6) in each of two opposing substantially parallel directions. Primary and secondary drive transfer members (1,2) extend on both sides of the drive transfer mechanism

(3) and are connected to the driving elements (6). Locking pins connected to both the primary and secondary drive transfer members (1,2) are arranged in pairs on both sides of the drive transfer mechanism (3) with one of each pair being connected to the primary drive transfer member (1) and the other of each pair being connected to the secondary drive transfer member (2), so that, in use, each pair of locking pins (4) are displaced towards and away from one another upon rotation of the handle to lock and unlock the leaf and frame.

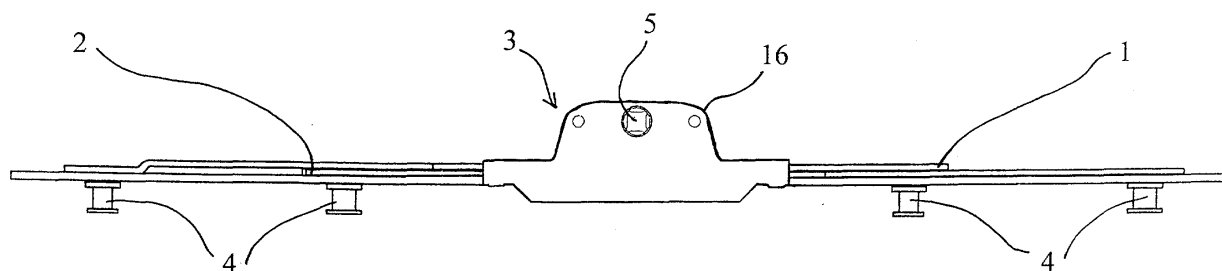


Fig. 1

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Description

[0001] Espagnolette bolt mechanisms are used in doors and windows to achieve a secure fastening of the door or window and generally include a drive mechanism which transmits rotation of a handle into translational movement of an espagnolette bolt. The espagnolette bolt generally includes locking pins which engage the side of the frame adjacent the mechanism. The locking pins are usually received in a striking plate or plates attached to the fixed frame of the assembly.

[0002] Espagnolette bolt mechanisms typically provide one drive transfer member carrying the locking pins, extending on one or both sides of the drive mechanism, and which moves between a locked and an unlocked position. The drive transfer member or members are usually located in shallow grooves in the movable leaf of the window or door. A window or door fitted with an espagnolette bolt mechanism may be susceptible to forced opening. All of the locking pins in espagnolette bolt mechanisms engage in their respective striker plates from the same direction, therefore, a force applied to the window or door in an opposing direction may generate sufficient movement to disengage the locking pins and permit opening of the window or door.

[0003] Shoot bolt mechanisms typically provide two drive transfer members one extending on each side of the drive mechanism, and moving in opposing substantially parallel directions between the locked and unlocked positions. Shoot bolt mechanisms provide greater security since a forcing movement on the window or door in one direction only tends to disengage the locking pins connected to one of the two drive transfer members. The locking pins on the other drive transfer member are forced more firmly into engagement with the striker plates. Espagnolette bolt and shoot bolt mechanisms usually incorporate a plurality of locking pins on each of the drive transfer members for improved security.

[0004] According to the present invention, a bi-directional espagnolette locking mechanism for use in locking a movable leaf into a surrounding fixed frame comprises a drive transfer mechanism for connection to a rotatable handle and adapted, in use, to convert rotary movement of the handle into simultaneous translatory movement of driving elements in each of two opposing substantially parallel directions, primary and secondary drive transfer members extending on both sides of the drive transfer mechanism and connected to the driving elements, and locking pins connected to both the primary and secondary drive transfer members and arranged in pairs on both sides of the drive transfer mechanism with one of each pair connected to the primary drive transfer member and the other of each pair connected to the secondary drive transfer member, so that, in use, each pair of locking pins are displaced towards and away from one another upon rotation of the handle to lock and unlock the leaf and frame.

[0005] Preferably, the mechanism further comprises striker plates for connection to the fixed frame and arranged to receive and retain the locking pins in the locked position. The striker plates typically have pairs of opposite hand locking pin receiving openings. Thus each striker plate receives a pair of locking pins. This allows for the same part to be used on both sides of the drive transfer mechanism when fitting espagnolette bolt mechanisms. Where bi-directional espagnolette bolt mechanisms are fitted, both of each pair of locking pin receiving openings may be engaged simultaneously when, in use, the locking pins are moved towards one another. Where striker plates having more than one pair of locking pin receiving openings are fitted, a first pair of locking pin receiving openings may be used when the movable leaf is in a fully locked position in the fixed frame. A second pair of locking pin receiving openings may be used to lock the movable leaf in a position slightly ajar to allow, for example, night ventilation.

[0006] A rubber seal is usually provided between the periphery of the movable leaf and the frame to provide greater sound proofing and weather protection. The rubber seal becomes compressed between the fixed frame and the movable leaf as the window or door is closed. The degree of seal compression may be altered by adjusting the spatial relationship between the primary drive transfer member and faces of the locking pin which contact the striker plate. This may be achieved by the use of adjustable eccentric locking pins connected to the primary drive transfer members.

[0007] Locking pins connected to the secondary drive transfer members may be fixed and of a smaller gauge relative to the locking pins connected to the primary drive transfer members. Locking pins connected to the secondary drive transfer members should be substantially unloaded under normal operation of the mechanism. However, if the movable leaf is forced either in a direction substantially parallel but opposite to the locking direction of movement of the secondary drive transfer members or transversely out of the frame, the locking pins connected to the secondary drive transfer members engage the striker plates located on both sides of the drive transfer mechanism and resist movement of the movable leaf relative to the fixed frame.

[0008] Preferably, the drive transfer mechanism comprises a drive pinion mounted on a housing for rotation relative to the housing by the handle, the pinion meshing with the primary drive transfer member.

[0009] In order to provide a compact, easy fitting, versatile mechanism, the primary drive transfer members preferably overlay the secondary drive transfer members, the primary drive transfer members lying closest to the drive transfer mechanism. The driving elements may be connected to the drive transfer members via protrusions extending from the driving elements engaging with cut away portions of the drive transfer members. A protrusion extending from one of the driving elements connecting said driving element with the primary drive

transfer members is longer than the protrusion extending from the other driving element connecting it with the secondary drive transfer members.

[0010] Preferably, end portions of the drive transfer members project beyond guide members which are fixed at corners of the movable leaf, for engagement with shoot bolt keeps on opposite ends or sides of the fixed frame when the mechanism is in the locked position, and where the end portions of the drive transfer members are retracted into the guide members when the mechanism is in the unlocked position.

[0011] Preferably, the drive transfer mechanism comprises a small gear wheel arranged between the driving elements and being in meshing engagement with the driving elements so that movement of said one driving element through the drive causes simultaneous translatory movement in the opposing substantially parallel direction of the other driving element, where the gear wheel is rotatable about an axis normal to a plane containing the directions of movement of the driving elements. Preferably, the small gear wheel is made of steel.

[0012] A preferred embodiment of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a side elevation of a bi-directional espagnolette locking mechanism according to the present invention;

Figure 2 is an exploded perspective view of the present invention;

Figure 3 is a partial view of the drive mechanism of the present invention;

Figure 4 is a partial cross-section view of the present invention;

Figure 5 is a partial perspective view of a bi-directional espagnolette mechanism showing a proximal striker plate.

[0013] Referring to the drawings there is shown a mechanism which includes a drive transfer mechanism 3 for connection to a rotatable handle which fits into a square hole 5. The drive transfer mechanism 3 is adapted, in use, to convert rotary movement of the handle into simultaneous translatory movement of driving elements 6 in each of two opposing substantially parallel directions. Primary drive transfer members 1 and secondary drive transfer members 2 extend on both sides of the drive transfer mechanism 3. The drive transfer members 1 and 2 are connected to the driving elements 6. The drive transfer members 1 and 2 move in a groove at the end face of a window or door.

[0014] Locking pins 4 are connected to both the primary and secondary drive transfer members 1 and 2. The locking pins 4 are arranged in pairs on both sides of the drive transfer mechanism 3 with one of each pair connected to the primary drive transfer members 1 and the other of each pair connected to the secondary drive transfer members 2. In use, rotation of the handle causes

movement of the primary and secondary drive transfer members 1 and 2 in opposing substantially parallel directions and cause each pair of locking pins 4 to move towards and away from one another.

[0015] The pairs of locking pins 4 are positioned to move into and out of engagement with striker plates 20 (shown in Figure 5) connected to the fixed frame. Each pair of locking pins 4 engages and disengages with a pair of locking pin receiving openings, one of each pair of locking pin receiving openings located on each of two opposite faces of the striker plate 20, when, in use, each pair of locking pins 4 move towards or away from one another.

[0016] The locking pins 4 connected to the primary drive transfer members 1 are eccentrically adjustable to allow adjustment of the location of a centre of the locking pins 4 relative to the primary drive transfer members 1 in order to permit adjustment of the seal compression of the movable leaf in the fixed frame when in the locked position. The locking pins 4 connected to the secondary drive transfer members 2 are fixed and of a smaller gauge compared to the locking pins 4 connected to the primary drive transfer members 1.

[0017] The primary drive transfer members 1 overlay the secondary drive transfer members 2 such that the primary drive transfer members 1 lie nearest the drive transfer mechanism 3 and the secondary drive transfer members 2 lie furthest from the drive transfer mechanism 3. Cut away portions in the secondary drive transfer members 2 allow locking pins 4 connected to the primary drive transfer members 1 to protrude through the secondary drive transfer members 2.

[0018] The driving elements 6 are connected to the drive transfer members 1 and 2 via protrusions 8 and 9 engaging with cut away portions 10 and 11. The adjustable eccentric locking pins 4 connected to the primary drive transfer members 1 ensure that the bulk of the force transferred from the drive transfer mechanism 3 to the drive transfer members 1 and 2 is carried by the primary drive transfer members 1.

[0019] A pinion 7, having the hole 5 therein, is mounted on a housing 16 of the drive transfer mechanism 3. The pinion 7 has three teeth for engagement with cut-away portions formed integrally in the primary drive transfer members 1. Rotation of the handle causes the pinion 7 to rotate and corresponding translatory movement of the primary drive transfer members 1.

[0020] Figure 2 shows in detail the drive transfer mechanism 3. Both of the driving elements 6 have toothed racks 18 facing inwardly for meshing engagement with a gear wheel 17 rotatable about an axis normal to a plane containing the directions of movement of the driving elements 6. The gear wheel 17 may be made from steel or other suitable material. The driving elements 6 rest adjacent the secondary drive transfer members 2. Translatory movement of the driving element 6 connected to the primary drive transfer members 1 causes translatory movement of the other driving ele-

ment 6 in a substantially parallel opposite direction.

[0021] Assembly of the locking mechanism described is easily achieved since the components may be assembled in a "drop-down" configuration. The driving elements 6 and small gear wheel 17 are positioned on a support member for fixing to the window or door. The secondary and primary drive transfer members 2, 1 are then located on the protrusions 8, 9 of the driving elements 6. Finally, the drive transfer mechanism 3 having the drive pinion 7 is connected to the primary drive transfer member 1, and the locking pins 4 fixed to the drive transfer members 1, 2. By positioning the driving elements 6 external from the drive mechanism housing 16 it is possible to provide driving elements 6 of greater strength when compared with those located within the housing 16 since there is a decreased space constraint.

[0022] A further feature of the present invention may be to extend the drive transfer members 1 and 2 beyond guide members which are fixed at corners of the movable leaf, for engagement with shoot bolt keeps on opposite ends or sides of the fixed frame when the mechanism is in the locked position, and where the end portions of the drive transfer members 1 and 2 are retracted into the guide members when the mechanism is in the locked position.

Claims

1. A bi-directional espagnolette locking mechanism for use in locking a movable leaf into a surrounding fixed frame comprising;
 - a drive transfer mechanism (3) for connection to a rotatable handle and adapted, in use, to convert rotary movement of the handle into simultaneous translatory movement of driving elements (6) in each of two opposing substantially parallel directions;
 - primary and secondary drive transfer members (1,2) extending on both sides of the drive transfer mechanism and connected to the driving elements (6), and
 - locking pins (4) connected to both the primary and secondary drive transfer members (1,2) and arranged in pairs on both sides of the drive transfer mechanism (3) with one of each pair connected to the primary drive transfer member (1) and the other of each pair connected to the secondary drive transfer member (2), so that, in use, each pair of locking pins (4) are displaced towards and away from one another upon rotation of the handle to lock and unlock the leaf and frame.
2. A mechanism according to claim 1, further comprising striker plates (20) for connecting to the fixed frame and arranged to receive and retain the locking pins (4) in the locked position.
3. A mechanism according to any one of claims 1 or 2, wherein the locking pins (4) connected to the primary drive transfer members (1) are eccentrically adjustable and wherein the locking pins (4) connected to the secondary drive transfer members (2) are fixed and are of a reduced gauge relative to the locking pins (4) connected to the primary drive transfer members (1).
4. A mechanism according to any one of the preceding claims, wherein the drive transfer mechanism (3) comprises a drive pinion (7) mounted on a housing (16) for rotation relative to the housing (16) by the handle, the pinion meshing with the primary drive transfer members (1).
5. A mechanism according to any one of the preceding claims, wherein the primary drive transfer members (1) overlay the secondary drive transfer members (2) such that the primary drive transfer members (1) lie nearest the drive transfer mechanism (3) and the secondary drive transfer members (2) lie furthest from the drive transfer mechanism (3).
6. A mechanism according to any one of the preceding claims, wherein a protrusion (8) extending from one of the driving elements (6) connecting said driving element with the primary drive transfer members (1) is substantially longer than a protrusion (9) extending from the other driving element connecting said driving element (6) with the secondary drive transfer members (2).
7. A mechanism according to any one of the preceding claims, wherein there exists a cut away portion (12) on the secondary drive transfer members (2) to allow the protrusion (10) extending from one of the driving elements (6) connected with the primary drive transfer members (1) unobstructed translatory movement when the mechanism is in use.
8. A mechanism according to any one of the preceding claims, wherein end portions of the drive transfer members (1,2) project beyond guide members which are fixed at corners of the movable leaf, for engagement with shoot bolt keeps on opposite ends or sides of the fixed frame when the mechanism is in the locked position, and where the end portions of the drive transfer members (1,2) are retracted into the guide members when the mechanism is in the unlocked position.
9. A mechanism according to any one of the preceding claims, wherein the drive transfer mechanism comprises a small gear wheel (17) arranged between the driving elements (6) and being in meshing engagement with the driving elements (6) so that movement of said one driving element (6) through

the drive causes said opposite movement of the other driving element (6), where the gear wheel (17) is rotatable about an axis normal to a plane containing the directions of movement of the driving elements (6).

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10. A mechanism according to claim 9, wherein the small gear wheel (17) is made of steel.

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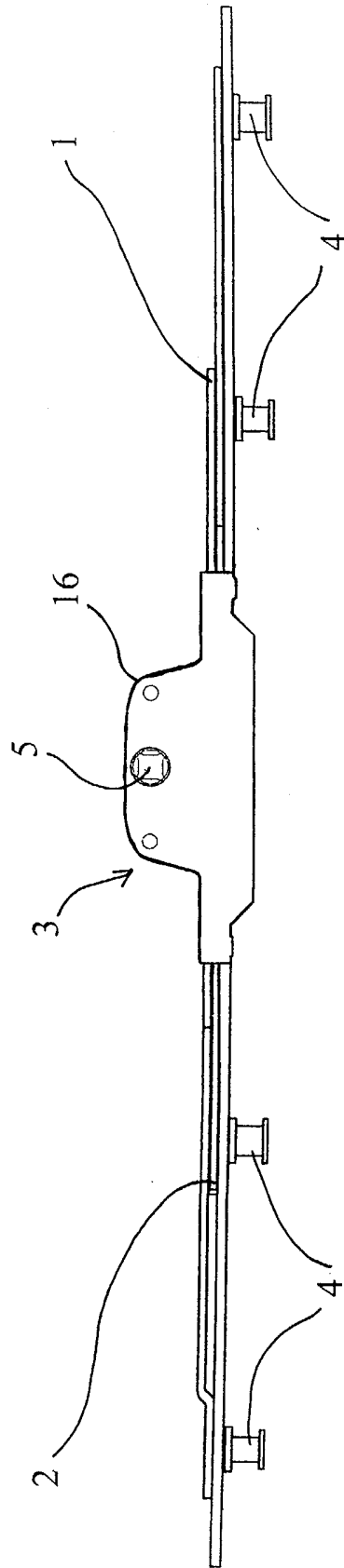


Fig. 1

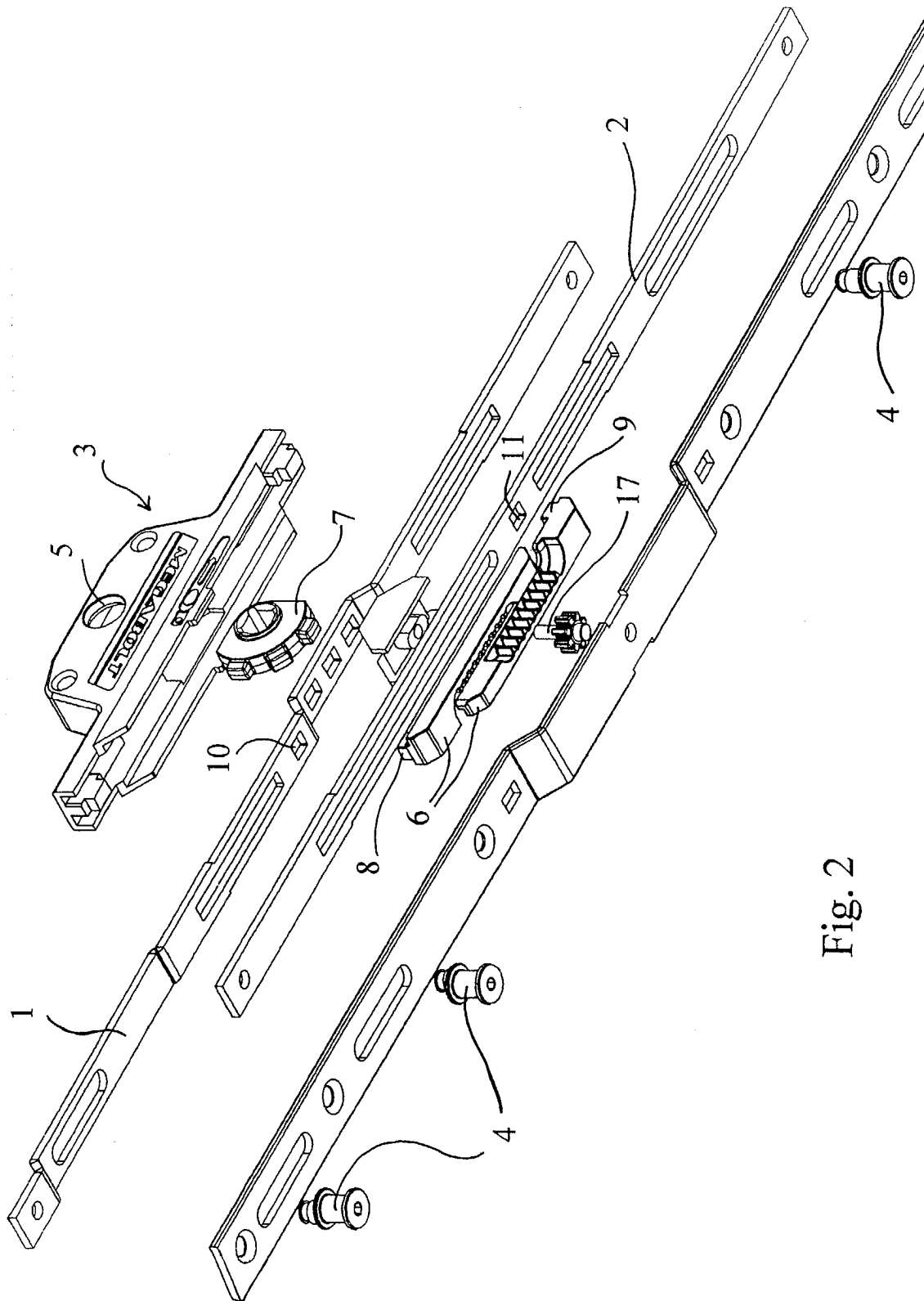


Fig. 2

Fig. 3

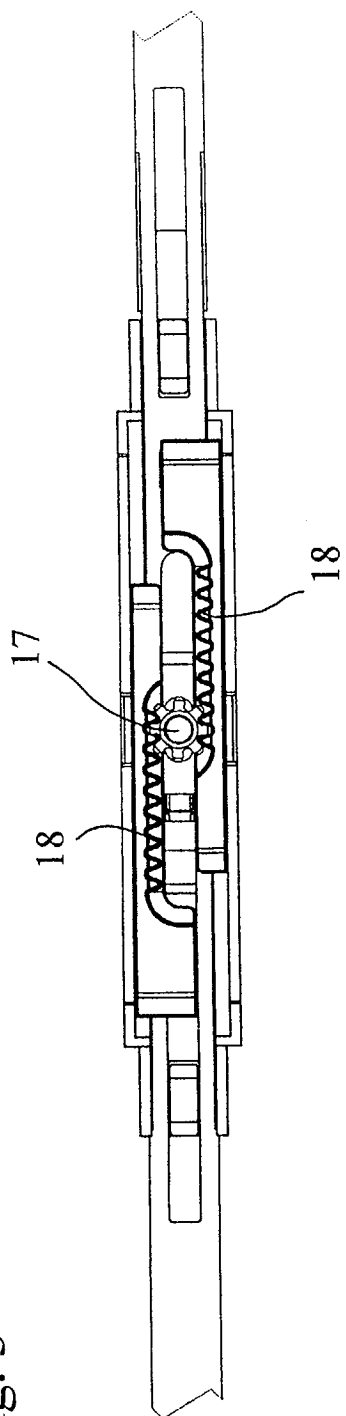
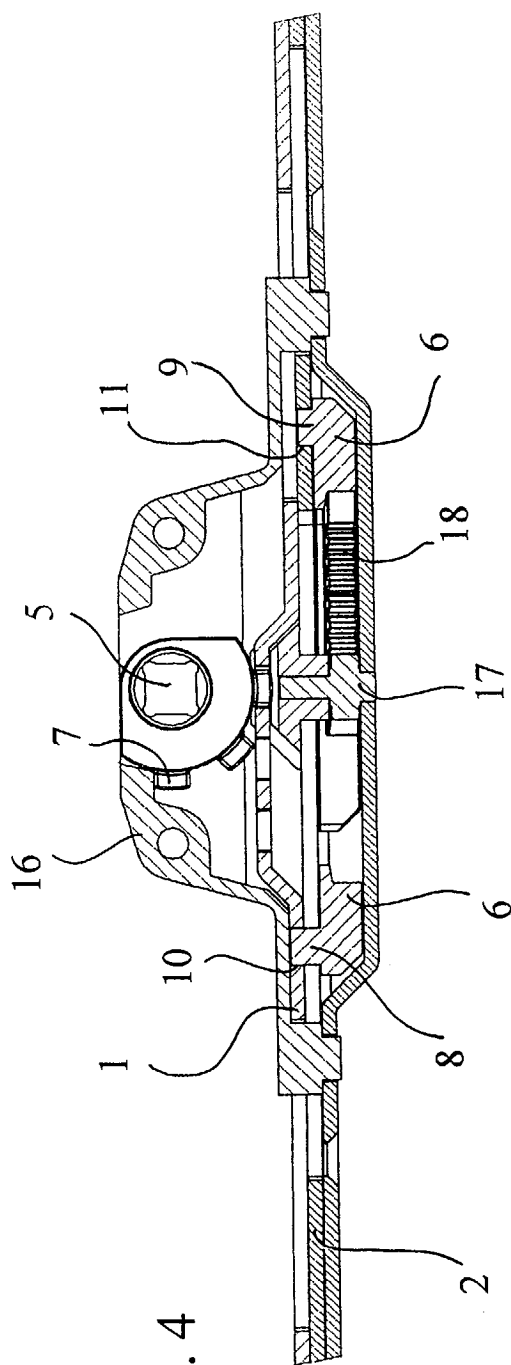


Fig. 4



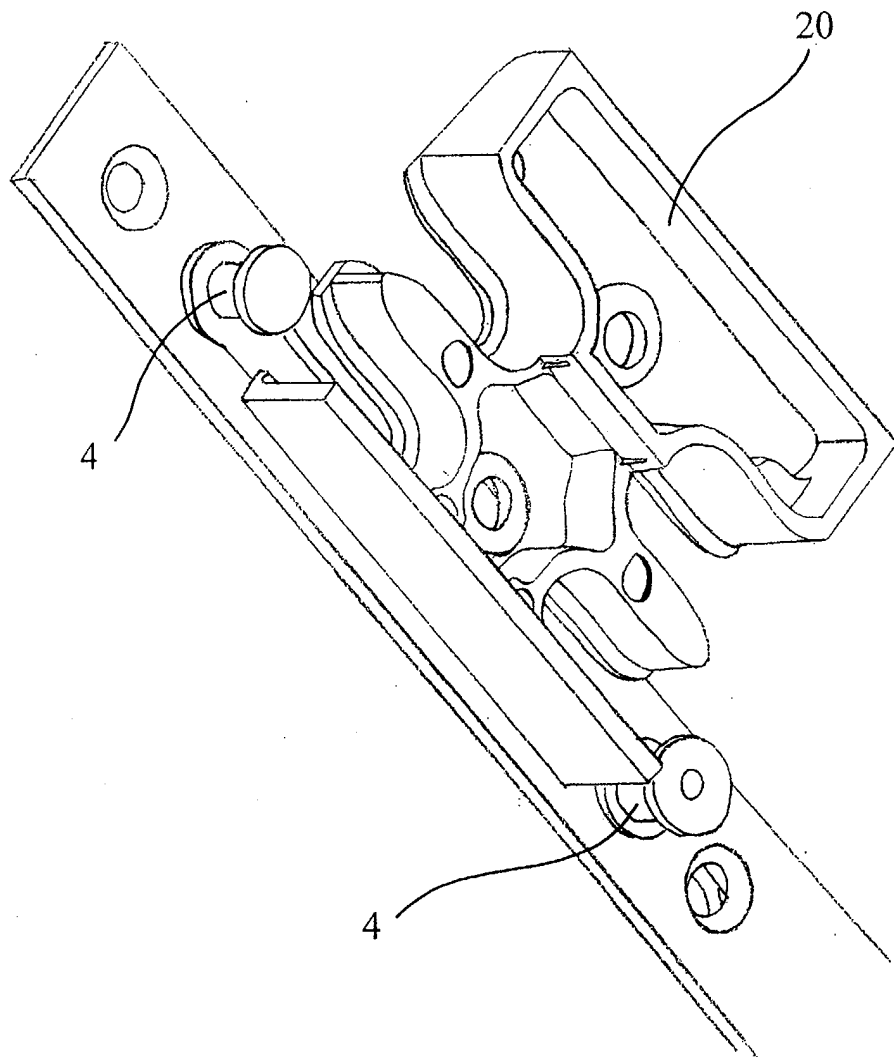


Fig. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 03 25 4717

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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