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(54) **Improvements in and relating to a latch mechanism**

(57) This invention relates to a latch mechanism for a closure. The latch mechanism comprises a keep means (8), a latch body (14), a latch means (12) and means (14, 15: 24) for preventing movement of said latch means (12) from said engaged to said disengaged position in response to movement of said latch body (16) away from

said keep means (8). The keep means (8) and the latch body (14) being mounted one on each of a frame and a moveable member of the closure, and the latch means is mounted for movement relative to said latch body between a disengaged position and an engaged position with respect to said keep means.

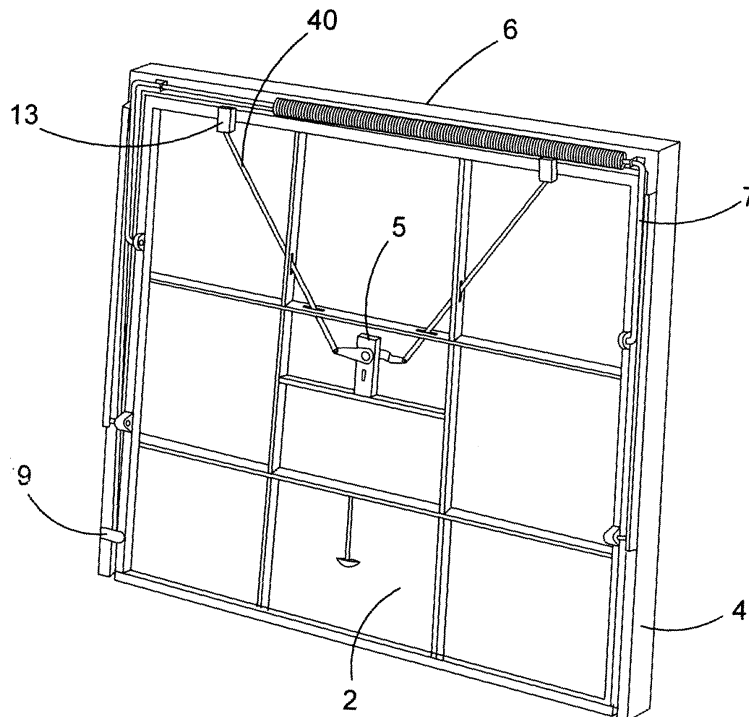


FIG. 1

Description

[0001] The present invention relates to an improved latch mechanism, and in particular to such a mechanism as used to secure a door. The invention has particular application in the locking of garage doors where a self-actuating latch engagement is preferable to a secondary operation at the door handle.

[0002] There are many types of doors where it is useful to have a latch automatically engage when the door moves into the closed position. In particular garage doors often use such a system and this allows the user to move the door into the closed position and have the latch engage without having to then turn or throw a handle for the latch to secure the door in the closed position.

[0003] Many garage doors are constructed where the main door acts as a single leaf. This door leaf can be supported in a number of different ways to allow the leaf to be moved between a fully open and fully closed position. When moved into the closed position it is advantageous to have a locking system that provides security such that the door cannot be opened by any unauthorized person.

[0004] Many doors are provided with a securing method that allows a door to close and for a latch to automatically engage. The type of latch is often described as a 'slam latch' due to the automatic engagement and also in regard to the slam action which is associated with the force required to allow the door to override the resistance in the latch during closing.

[0005] Present slam latches tend to be problematic. The construction of the latch often demands that a sprung loaded bolt with a ramped face must be forced over a surface prior to engagement. Often, because of the limitations of such a mechanism, the final engagement of the latch is approximately some 12 mm. Unfortunately because of the large size of garage doors, the associated gaps of single leaf doors and the operating flexibility of the doors gear this engagement does not provide a good level of security. The door leaf can in practice be easily forced to disengage the latch from its keep and the door can then be opened without a key.

[0006] The present invention seeks to provide an improved latch mechanism.

[0007] Accordingly, the present invention provides a latch mechanism for a closure comprising: a keep means for mounting on one of a frame and a movable member of said closure; a latch body for mounting on the other of said frame and movable member of said closure; a latch means mounted for movement relative to said body between a first, disengaged position wherein said latch means is disengaged from said keep means and a second, engaged position wherein said latch means is engaged with said keep means; and means for preventing movement of said latch means from said engaged to said disengaged position in response to movement of said latch body away from said keep means.

[0008] It is the advantage of the present invention that

it significantly improves the security of the latch and its operation.

[0009] The invention will now be described, by way of example only, with reference to the accompanying Figures, in which:-

Figure 1 shows an example of a prior art garage door locking system;

Figure 2 shows the detail of the prior art slam latch as used on the door shown in Figure 1;

Figure 3 shows a first embodiment of a preferred form of slam type latch according to the present invention;

Figure 4 shows a second embodiment of a latch mechanism according to the present invention; and

Figures 5a, 5b and 5c show two further forms of latch mechanism according to the present invention.

[0010] In the drawings like parts are given like reference numbers.

[0011] Referring first to Figure 1, this shows a framed canopy door in which the operating or lifting gear is provided by a known torsion spring assembly.

[0012] A door leaf 2 is shown supported within a frame 4, comprising a frame head 6 and first and second frame legs. The door leaf 2 is supported by first and second canopy arms 7 that are free to pivot within respective first and second head brackets fixed at the frame head. The door is shown from the inside. On opening the top of the door moves inside the opening and the bottom of the door moves outwards and upwards. The door is shown in the closed position where top of the door leaf 2 has abutted against the top of the frame. A second stop 9 prevents the bottom of the door leaf 2 moving into the inside space.

[0013] When closed the door leaf 2 is secured in the closed position by a single or set of latches. To open the door leaf 2 a lock with handle 5 must be activated to provide motion in the linking system or cable 40. This motion will disengage the latch and allow the door leaf 2 to be pushed and lifted into the open position.

[0014] A representation of a typical latch arrangement will now be described with reference to Figure 2. The top of a door leaf 2 is shown moving in the direction shown by arrow 'A' towards the stop 4 that is attached to or part of the frame head 6. A latch keep 8 with a tapered lead section 10 is secured to the frame head 6.

[0015] A bolt 12 is located in a latch body 14. The bolt 12 is loaded by a spring 16. As the door leaf 2 moves towards the frame 6 the ramp face of the bolt 12 comes into contact with the tapered face 10 of the keep 8. The bolt 12 is forced down into the latch body 14, compressing the spring 16. When the door leaf 2 meets stop 4 the bolt 12 is aligned with the opening in the keep 8 and the spring

16 forces the bolt into engagement with the keep 8. The door leaf 2 cannot then be opened without some action to disengage the bolt 12 from the keep 8.

[0016] A link or cable mechanism not shown in Figure 2 connects the door handle (not shown) to the connecting point 18 of the bolt 12. By rotating the handle the user can apply a downward motion to the bolt 12 such that the latch is disengaged and the door can be opened.

[0017] This mechanism is commonly used on garage doors. There are other mechanisms (not shown) that use torsion springs to activate a bolt that pivots into engagement with a keep. Further, some of these types of mechanism have bolts that engage against relatively flat plates (not shown) when the door moves to the closed position.

[0018] In practice it is very easy to overcome the security provided by the latch system described above and shown in Figure 2. Single piece garage doors often have relatively large gaps at the sides and top and bottom of the door leaf. This allows some movement in the door leaf. By locating a suitable lever into these gaps it can be quite easy to force the door leaf away from the frame and disengage the latches. Once this has occurred then the door can be opened.

[0019] A first embodiment of the invention is shown in Figure 3. The top of a door leaf 2 of a typical "up and over" garage door is shown as moving in the closing direction of arrow 'A' towards the stop 4 that is attached to or part of the frame head 6. A keep means in the form of a latch keep 8 with a tapered face or lead section 10 is secured to the frame head 6.

[0020] A latch means in the form of a bolt 12 is located in a latch body 16 for sliding movement between a first, disengaged position and a second, engaged position. The bolt 12 is biased by a resilient means in the form of a spring 22 towards the engaged position. The bolt has a notch or slot 21 in its trailing edge which is shaped to engage around an edge 15 of an opening 11 of the keep 8.

[0021] The bolt 12 has a lateral guide pin 17 that engages in a guide slot 20 formed in the latch body. The guide slot is shaped such that as the bolt is retracted towards its disengaged position the bolt also moves laterally to the right as seen in Figure 3.

[0022] As the door leaf 2 moves towards the frame 6 on closing, the ramp face of the bolt 12 comes into contact with the face 10 of the keep 8 forcing the bolt 12 down into the latch body 16 against the spring 22. As explained above, this also causes the bolt to move to the right in Figure 3. When the bolt clears the face 10 of the keep and aligns with the opening 11 the spring 22 forces the bolt 12 upwards into the opening 11. At the same time, the cooperation of the guide slot 20 and pin 17 causes the bolt to move back towards the left in Figure 3, with the result that the slot 21 engages over the edge 15 of the opening 11. This prevents the bolt 12 from being withdrawn from the keep 8 simply by forcing the leaf 2 and frame head 6 apart with only a single directional movement. The door leaf 2 cannot then be opened without some action to disengage the bolt 12 from the keep 8.

[0023] A link or cable mechanism not shown in Figure 3 connects the door handle (not shown) to the connecting point 18 of the bolt 12. By rotating the handle the user can apply a downward motion to the bolt 12 such that it begins to move. The path controlled by the guide slot 20 forces the guide pin 17 to move the bolt 12 to the right as seen in Figure 3 such that the slot 21 disengages from the edge 11 and the bolt 12 moves out of engagement with the keep 8. The bolt 12 can then be retracted further into the fully disengaged position such that the door can be opened.

[0024] A second embodiment of the invention is shown in Figure 4. In this embodiment a retaining means in the form of a slide 30 is slidably located in a groove or bore 19 in the latch body 14. The bore 19 intersects the path of the bolt 12 such that the slide 30 can be moved between a first position where it intersects the path of the bolt 12 and retains the bolt in its disengaged position and a second, withdrawn position where it releases the bolt 12 for movement into its keep engaging position. A biasing means in the form of spring 32 biases the slide 30 towards its first position.

[0025] A link or cable mechanism not shown in Figure 4 connects the door handle (not shown) to the connecting point 18 of the bolt 12. By rotating the handle the user can apply a downward motion to the bolt 12 such that it moves out of engagement of the keep 8.

[0026] When the bolt 12 is drawn out of engagement with the keep 8 the slide 30 is moved by spring 32 over the top of the bolt 12 thereby preventing the bolt 12 from moving back towards the engaged position. The bolt 12 is then held in the disengaged position as shown in Figure 4 until the door is moved into the closed position.

[0027] On closing, as the door leaf 2 moves towards the frame 6 in the direction of arrow 'A' the end of the keep 8 moves into the bore 19 in the latch body 10 and pushes the slide 30 to the left as seen in Figure 4, compressing spring 32. Once the slide 30 is pushed back away from the bolt 12 the latter is then forced upwards by spring 16 to engage with the keep 8. The door leaf 2 cannot then be opened without some action to disengage the bolt 12 from the keep 8. As the keep 8 is restrained in the latch body 10 and locked by the location of the bolt 12 the parts cannot be easily disengaged and the mechanism provides a very secure locking system.

[0028] Once the bolt 12 is disengaged from the keep, the slide 30 is moved back over the bolt 12 by the force from the spring 18.

[0029] Referring now to Figures 5a, 5b and 5c, these show a latch mechanism similar to that shown in Figure 3, but here the latch body 14 is provided with a horizontally extending flange 40 formed on an extension 42 of the latch body, which extends above the latter, such that when the door leaf is moved into its closed position the extension 40 lies above a support member 42 and thus prevents the door leaf 2 and the frame head 6 being moved apart sufficiently to allow the bolt 12 to clear the opening 11.

[0030] An alternative or additional security feature is the provision of a pin or spigot 24 on the frame head 6 which engages in a slot in a vertical plate 26, secured to the door leaf 2. This serves the purpose of again preventing the door leaf 2 and frame head 6 being moved apart sufficiently to cause the bolt 12 to clear the opening 11.

[0031] A further embodiment (not shown) but similar in operation to that shown in Figure 4 could incorporate a slide mechanism operating in a different plane to that shown such that the latch mechanism could be applied to a door leaf moving in a vertical orientation. The line of action of the slide 30 would simply be modified to accommodate the local movement of the door leaf.

[0032] A further embodiment (not shown) might incorporate a latch mechanism shown in Figure 2 but with the addition of a secondary device to engage the door leaf with the frame. This might be achieved with either a protrusion supported by the door leaf that engaged into a recess in the frame or a protrusion from the frame engaging into a provision on the door leaf.

Claims

1. A latch mechanism for a closure comprising:

a keep means (8) for mounting on one of a frame and a movable member of said closure;
 a latch body (14) for mounting on the other of said frame and movable member of said closure;
 a latch means (12) mounted for movement relative to said body between a first, disengaged position wherein said latch means is disengaged from said keep means and a second, engaged position wherein said latch means is engaged with said keep means;
 and means (14, 15; 24) for preventing movement of said latch means (12) from said engaged to said disengaged position in response to movement of said latch body (16) away from said keep means.

2. A latch mechanism as claimed in claim 1 wherein:

said keep means has an opening for receiving said latch means;
 and said means for preventing movement of said latch means from said engaged to said disengaged position comprises a surface engageable with said keep means.

3. A latch mechanism as claimed in claim 2 wherein said surface is a shoulder formed on said latch means and engageable over a cooperating surface of said keep means.

4. A latch mechanism as claimed in claim 3 wherein

said cooperating surface of said keep means is formed by an edge of said opening.

5. A latch mechanism as claimed in claim 2 wherein:

said latch body has retaining means movable between first and second positions wherein in said first position said retaining means retains said latch means in said disengaged position and in said second position said retaining means allows movement of said latch means towards said engaged position.

6. A latch mechanism as claimed in claim 5 wherein movement of said latch body and said keep means towards one another to engage said latch means with said keep means causes said retaining means to move from said first towards said second position thereby to release said latch means for movement towards said engaged position.

7. A latch mechanism as claimed in claim 6 wherein said retaining means comprises a slide (30) and said keep means is engageable with said slide thereby to move said slide into said second position.

8. A latch mechanism as claimed in claim 7 wherein said means for preventing movement of said latch means from said engaged to said disengaged position comprises a surface of said latch body engageable with said keep means when said keep means engages said slide to move said slide into said second position.

9. A latch mechanism as claimed in claim 2 wherein said surface is a surface on said latch body engageable with said keep means.

10. A latch mechanism as claimed in any preceding claim wherein said latch means is resiliently biased towards said engaged position.

11. A door assembly incorporating a latch mechanism in accordance with any of the preceding claims.

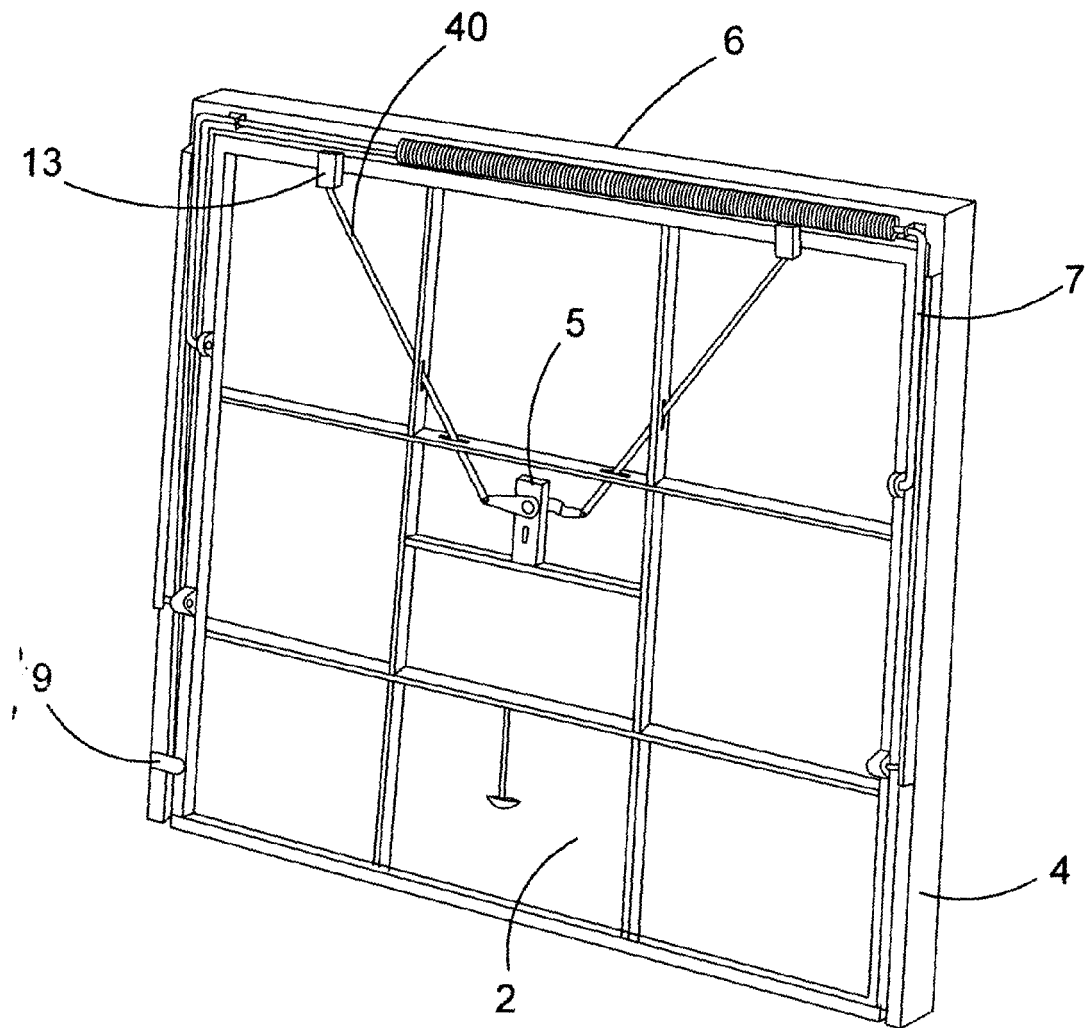
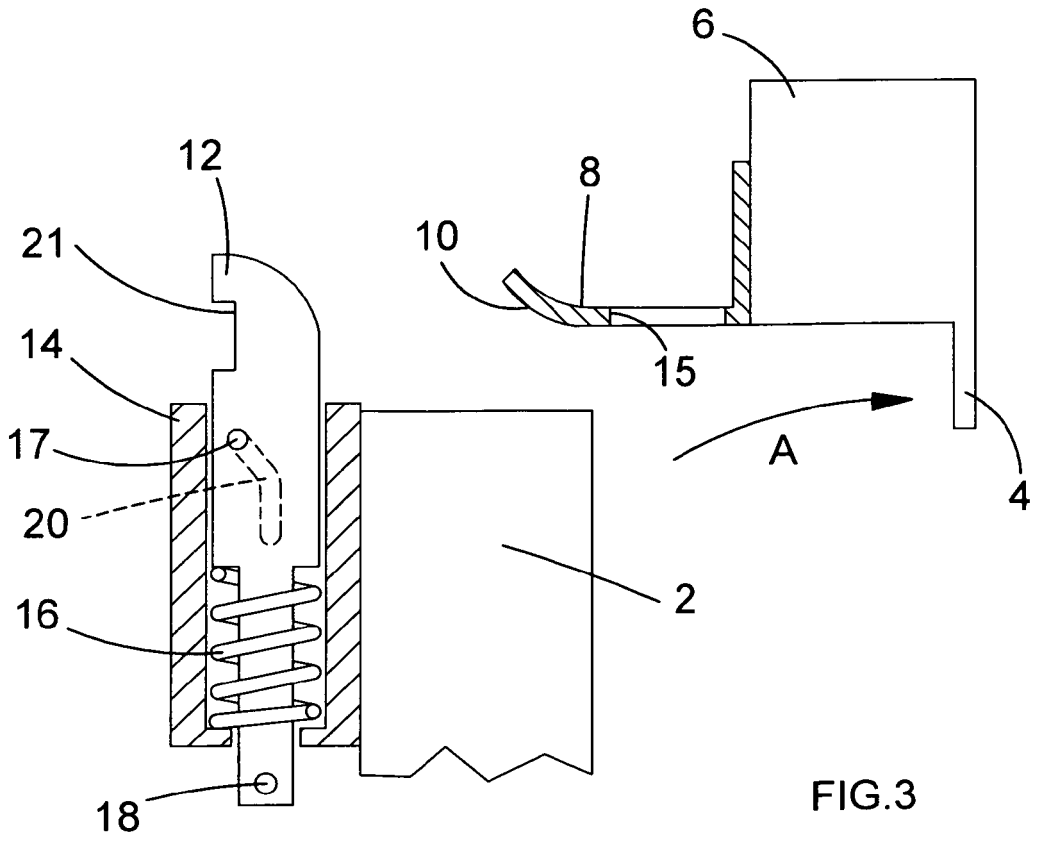
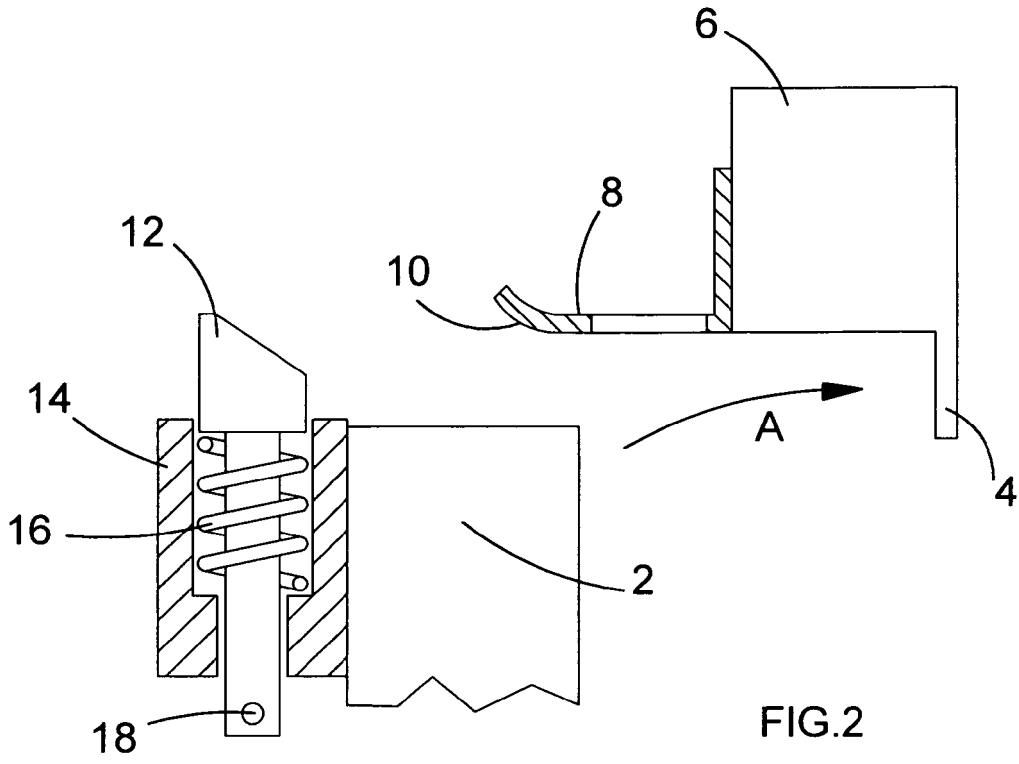


FIG.1



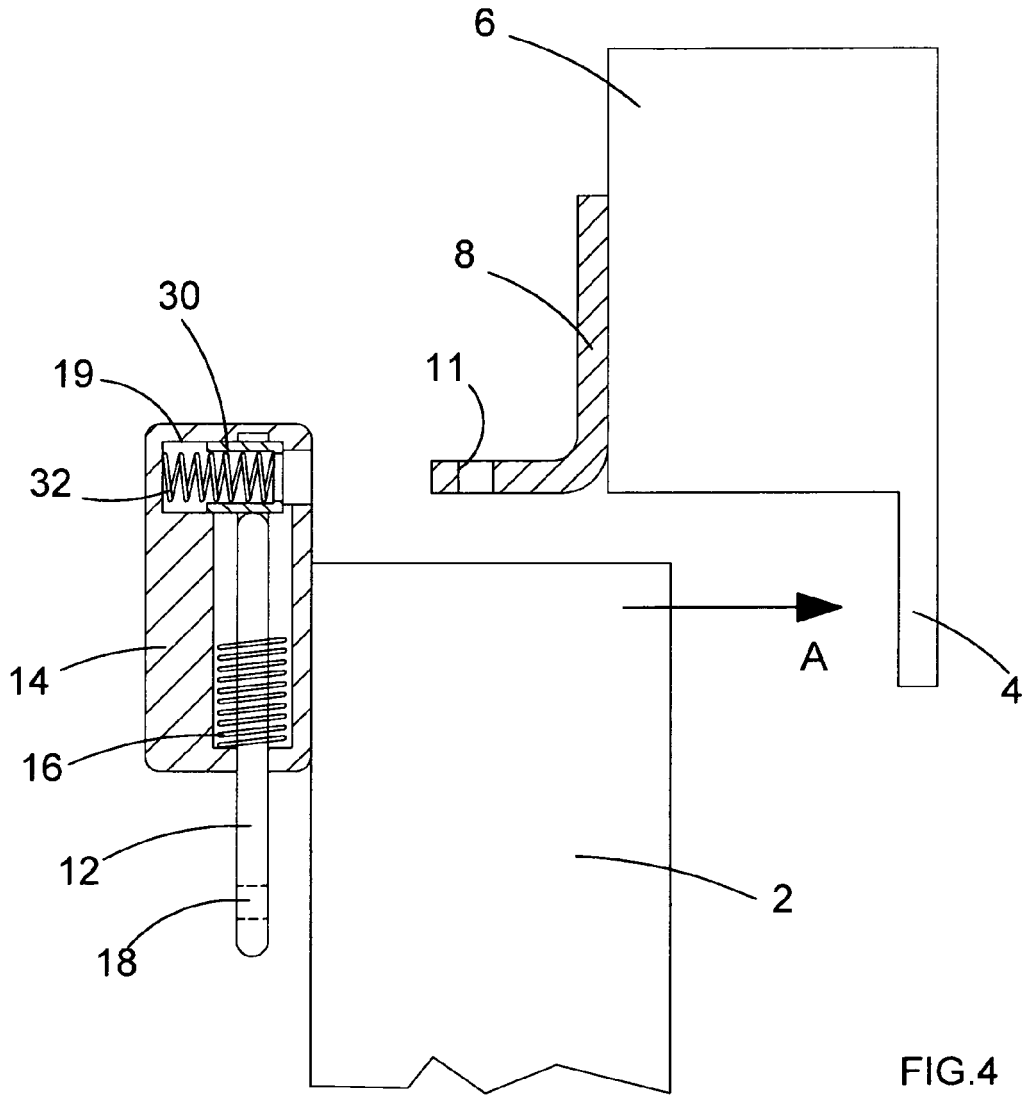


FIG.4

