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(54) **Friction hinge assembly**

(57) A friction hinge assembly (40) for mounting an openable closure member (62), such as a top hung or side hung window, on a fixed frame (63), and which comprises a guide track (41) which is securable to a fixed frame member of the fixed frame and a linkage (42) which is connected to the guide track (41) so as to be moveable between open and closed positions relative to the guide track (41) and which has a mounting arm (43) which is securable to a frame element of the moveable closure member (62), and in which: the guide track (41) has a retainer (54) secured to one end of the guide track and having an upstanding retaining formation (57); the mounting arm (43) has a hook (58) secured to one end and which is moveable into engagement with the upstanding retaining formation (57) as the linkage (42) moves to the closed position; the engagement between the hook (58) and the retaining formation (57) provides a resisting force which is directly opposite to any separating force applied between the fixed frame (63) and the moveable frame (62) in the region of the hinge axis (65) provided by the friction hinge assembly (40); and, the greater the separating force which is applied, the more will the hook (58) move into captive engagement with the retaining formation (57) to provide an enhanced resisting force.

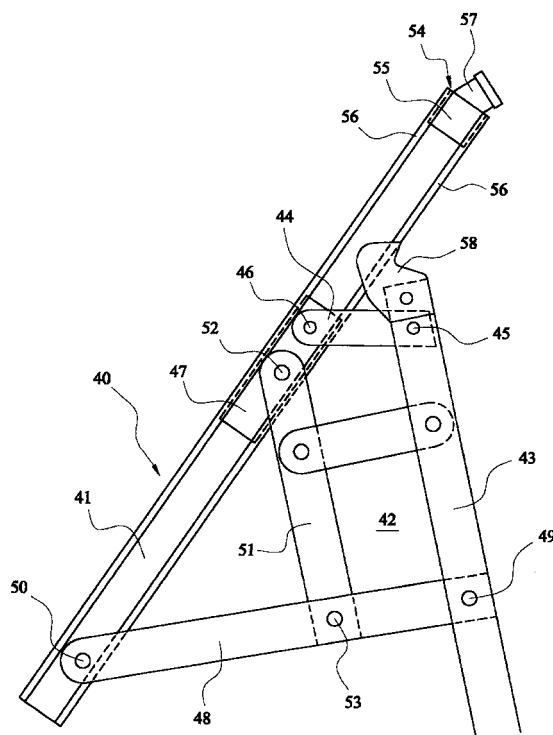


FIG. 1

Description

[0001] This invention relates to a friction hinge assembly for mounting a closure member, such as an openable window, on a fixed frame.

[0002] Friction hinge assemblies are well known in the art, and will therefore not be described in detail herein. Essentially, a fixed guide track is provided, which is usually secured to a frame member of a fixed frame, and a 4 or 5 bar type of linkage is connected to the guide track and has one arm secured to a frame element of a closure member, e.g. a top hung or side hung window.

[0003] The linkage is usually connected to the guide track by a slide block which is moveable lengthwise of the guide track during opening and closing movement of the linkage. Also, to provide greater security (and for sealing) when in the closed position, it is usual to provide some type of inter-engagement between a retainer arrangement on the guide track and a projecting part of the linkage, so as to resist any unauthorised attempt at forced opening of the window from externally of the window e.g. by an intruder entering a jemmy or the like between the fixed frame and the moveable window frame with a view to prising them apart.

[0004] Existing designs of retainer arrangement on a guide track can take the form of so-called end caps, which are usually moulded from plastics material and which are pressfitted into one end of the guide track. The projecting part of the linkage is usually mounted on one end of the arm which is secured to the frame element of the moveable frame, and which moves into engagement with the end cap as the moveable frame moves to a fully closed position.

[0005] The end cap often, being made of plastics material, and press-fitted into the end of the guide track, does not provide a very robust construction, and therefore is liable to fail under load, either by fracturing or tearing of the cap, and / or by forced displacement of the cap from the guide track. Given the ever increasing customer demand for greater security, there is a need to provide increased security at this potentially vulnerable region which is located close to the hinge line (usually defined jointly by a pair of cooperating friction hinge assemblies).

[0006] The invention therefore seeks to meet this need by providing a more robust retainer arrangement on the guide track, and a co-operative projecting part on the linkage, which can withstand attempts at forced intrusion and also meet higher test standards which are being set.

[0007] According to the invention there is provided a friction hinge assembly for mounting an openable closure member, such as a top hung or side hung window, on a fixed frame, and which comprises a guide track which is securable to a fixed frame member of the fixed frame and a linkage which is connected to the guide track so as to be moveable between open and closed positions relative to the guide track and which has a

mounting arm which is securable to a frame element of the moveable closure member, and in which:

the guide track has a retainer secured to one end of the guide track and having an upstanding retaining formation;

the mounting arm has a hook secured to one end and which is moveable into engagement with the upstanding retaining formation as the linkage moves to the closed position;

the engagement between the hook and the retaining formation provides a resisting force which is directly opposite to any separating force applied between the fixed frame and the moveable frame in the region of the hinge axis provided by the friction hinge assembly; and,

the greater the separating force which is applied, the more will the hook move into captive engagement with the retaining formation to provide an enhanced resisting force.

[0008] The retaining formation and the co-operative engagement of the hook will be arranged in such a way as to provide an enhanced resisting force when required, and this arrangement can be achieved in a number of ways.

[0009] In one preferred arrangement, the retainer has a cap arranged to overlie at least part of the hook in the closed position, so as to resist relative separation in a direction perpendicular to the guide track and generally in the plane of the closure member. Also, the construction is such as to prevent buckling by preventing movement in line with the track.

[0010] The cap is preferably connected to a retaining leg which is shaped to engage in the recess defined by the hook, and to be engageable with the hook in such a way as to have ever increasing engagement and provide an enhanced resisting force as the separating force increases.

[0011] To provide a particularly strong retainer, it is preferred that the retainer is a metal fabrication.

[0012] A friction hinge assembly according to the invention is particularly, though not exclusively, suitable for use with a top hung window frame. However, it may also be used with a side hung window assembly.

[0013] A preferred embodiment of friction hinge assembly according to the invention will now be described in detail, by way of example only, and with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a friction hinge assembly, suitable for mounting a top hung (or a side hung) openable window on a fixed frame, and showing the component parts of the assembly in a partly open position;

Figure 2 is a plan view of the components of the assembly, but in which an operating linkage (which is connectable to a moveable window frame) over-

lies a fixed guide track to be mounted on a frame member of the fixed frame, (this is the position taken by the components in the closed position); and, Figure 3 is a perspective and diagrammatic illustration of a pair of hinge assemblies mounting a top hung window frame on a fixed frame, with the window frame shown in a partly open position.

[0014] Referring first to Figure 1 of the drawings, a friction hinge assembly according to the invention is designated generally by reference 40, and is intended to mount an openable closure member, such as a top hung or side hung window, on a fixed frame. The assembly 40 comprises a fixed guide track 41 which is securable to a fixed frame member of the fixed frame, and a linkage, designated generally by reference 42, which is connected to the guide track 41 so as to be moveable between open and closed positions relative to the guide track and which has a mounting arm 43 which is securable to a frame element of the moveable closure member.

[0015] The linkage 42 is a 4 or 5 bar type linkage, having mounting arm 43 and a short connecting arm 44 pivoted at one end 45 to one end of the arm 43, and pivoted at its opposite end 46 to a moveable slide block 47 which is moveable lengthwise of the guide track 41 during opening and closing movement of the linkage 42.

[0016] However, to function as an egress hinge, block 47 may be a fixed mounting block, and the fixed pivot mounting for arm end 50 can be replaced by a slidable mounting block (not shown).

[0017] The linkage 42 also includes a long connecting arm 48, pivoted at one end 49 to the mounting arm 43, and at its opposite end 50 to a fixed pivot mounting on one end of the guide track 41.

[0018] A control arm 51 extends substantially parallel to mounting arm 43, and is pivoted at one end 52 to the slide block 47, and at its opposite end 53 to the long connecting arm 48. Arms 43 and 51 therefore form an approximate parallelogram linkage, which controls the opening and closing movement of the linkage 42, in conjunction with pivotal movement of the long connecting arm 48 about pivot 50.

[0019] The guide track has a retainer secured to an end of the guide track opposite to the end provided with the pivot mounting 50, and the retainer is designated generally by reference 54. The retainer 54 is secured to the end of the guide track, and has a mounting portion 55 slidably received and held captive in the in-turned side walls 56 of the guide track 41 and an upstanding retaining formation 57 which is engageable by a projecting part provided on the end of the mounting arm 43, as will be described in more detail below.

[0020] Thus, the mounting arm 43 has a hook 58 secured to one end thereof and which is moveable into engagement with the upstanding retaining formation 57 as the linkage 42 moves to the closed position.

[0021] Figure 1 shows the linkage 42 in an open po-

sition, whereas Figure 2 shows the linkage 42 overlying the guide track 41, which is the position which they take up when the closure member (e.g. a top hung window) has been moved to the fully closed position.

[0022] The engagement between the hook 58 and the retaining formation 57 is such as to provide a resisting force which is directly opposite to any separating force which may be applied between the fixed frame and the moveable frame in the region of the hinge axis which is provided by the friction assembly. Furthermore, the arrangement is such that the greater the separating force which is applied (e.g. by a potential intruder, or during standard safety tests) the more will the hook 58 move into captive engagement with the retaining formation 57 to provide an enhanced resisting force.

[0023] Any suitable arrangement of the retaining formation 57 and the cooperative engagement of the hook 58 can be provided, so as to give an enhanced resisting force when required, and progressively increasing inter-engagement as a consequence of increased separating force.

[0024] In the preferred arrangement, the retainer 54 has a cap 59 which overlies at least part of the hook 58 in the closed position, so as to resist relative separation in a direction perpendicular to the guide track 41 and generally in the plane of the closure member.

[0025] In particular, when a force is applied perpendicular to the side of the track, the hook engages cap 59 so as to prevent any downward movement (possibly resulting from buckling of arms 43, 44).

[0026] The cap 59 is connected to a retaining leg 60 which is shaped to engage the recess 61 defined by the hook 58, and to be engageable with the hook in such a way as to have ever increasing engagement, and to provide an enhanced resisting force, as the separating force increases.

[0027] To provide a particularly strong retaining arrangement, it is preferred that the arrangement is a metal fabrication.

[0028] The illustrated embodiment therefore provides a hook which is directly fixed to the openable window frame, by being fixed in the region of the junction between the mounting arm 43 and the short connecting arm 44, and extending along the line of the mounting arm 43. The purpose of the hook is to engage on a robust assembly of cap (54) fitted on to the guide track 41, which is fixed to the outer frame.

[0029] When a load is applied to the corner of the window, the hook is forced on to the retaining leg of the cap. This action prevents the openable window (sash) from becoming dis-engaged from the retaining leg of the cap, which holds the sash and the frame in their respective positions and prevents the friction hinge (stay) from buckling and failing under load.

[0030] The only approved way to open the window is to apply a force at the bottom of the hinge, as shown by the arrow in Figure 2. This allows the geometry of the hinge assembly to rotate around the retaining leg, and

then withdraw from engagement therewith as the window opens. Normally, any intruder attempting forced separation between the window frame and the fixed frame will not be able to apply the separating force at this region, and particularly because it will usually be strongly resisted by separate espagnolette and other types of locking systems provided in this region of the window and frame assembly.

[0031] The illustrated arrangement of the engagement between the hook and the retaining arrangement is unique in not requiring either fixing, or a supporting lug to be inserted along the hinge line.

[0032] Figure 3 shows a typical top hung window frame 62, mounted on a fixed frame 63 via a pair of friction hinge assemblies 64, and showing a hinge line 65 defined by the friction hinge assemblies 64, and also the line of action of any load which may be generated by an intruder seeking forced separation between the window 62 and the frame 63 (when in the closed position), or any test load applied during safety tests.

[0033] The embodiment of security friction hinge assembly disclosed herein may include features of the restricted hinge assembly disclosed in our co-pending patent application filed on the same day as this application.

Claims

1. A friction hinge assembly (40) for mounting an openable closure member (62), such as a top hung or side hung window, on a fixed frame (63), and which comprises a guide track (41) which is securable to a fixed frame member of the fixed frame and a linkage (42) which is connected to the guide track (41) so as to be moveable between open and closed positions relative to the guide track (41) and which has a mounting arm (43) which is securable to a frame element of the moveable closure member (62), and in which:

the guide track (41) has a retainer (54) secured to one end of the guide track and having an upstanding retaining formation (57);

the mounting arm (43) has a hook (58) secured to one end and which is moveable into engagement with the upstanding retaining formation (57) as the linkage (42) moves to the closed position;

the engagement between the hook (58) and the retaining formation (57) provides a resisting force which is directly opposite to any separating force applied between the fixed frame (63) and the moveable frame (62) in the region of the hinge axis (65) provided by the friction hinge assembly (40); and,

the greater the separating force which is applied, the more will the hook (58) move into captive engagement with the retaining formation

(57) to provide an enhanced resisting force.

2. A friction hinge assembly according to claim 1, in which the retainer (54) has a cap (59) arranged to overlie at least part of the hook (58) in the closed position, so as to resist relative separation in a direction perpendicular to the guide track (41) and generally in the plane of the closure member (62), and / or to resist buckling under load applied generally perpendicular to the side of the track (41).
3. A friction hinge assembly according to claim 1 or 2, in which the retaining formation (57) includes a retaining leg (60) which is shaped to engage in the recess (61) defined by the hook (58), and to be engageable with the hook (58) in such a way as to have ever increasing engagement and provide an enhanced resisting force as the separating force increases.
4. A friction hinge assembly according to any one of claims 1 to 3, in which the retainer (54) is a metal fabrication.

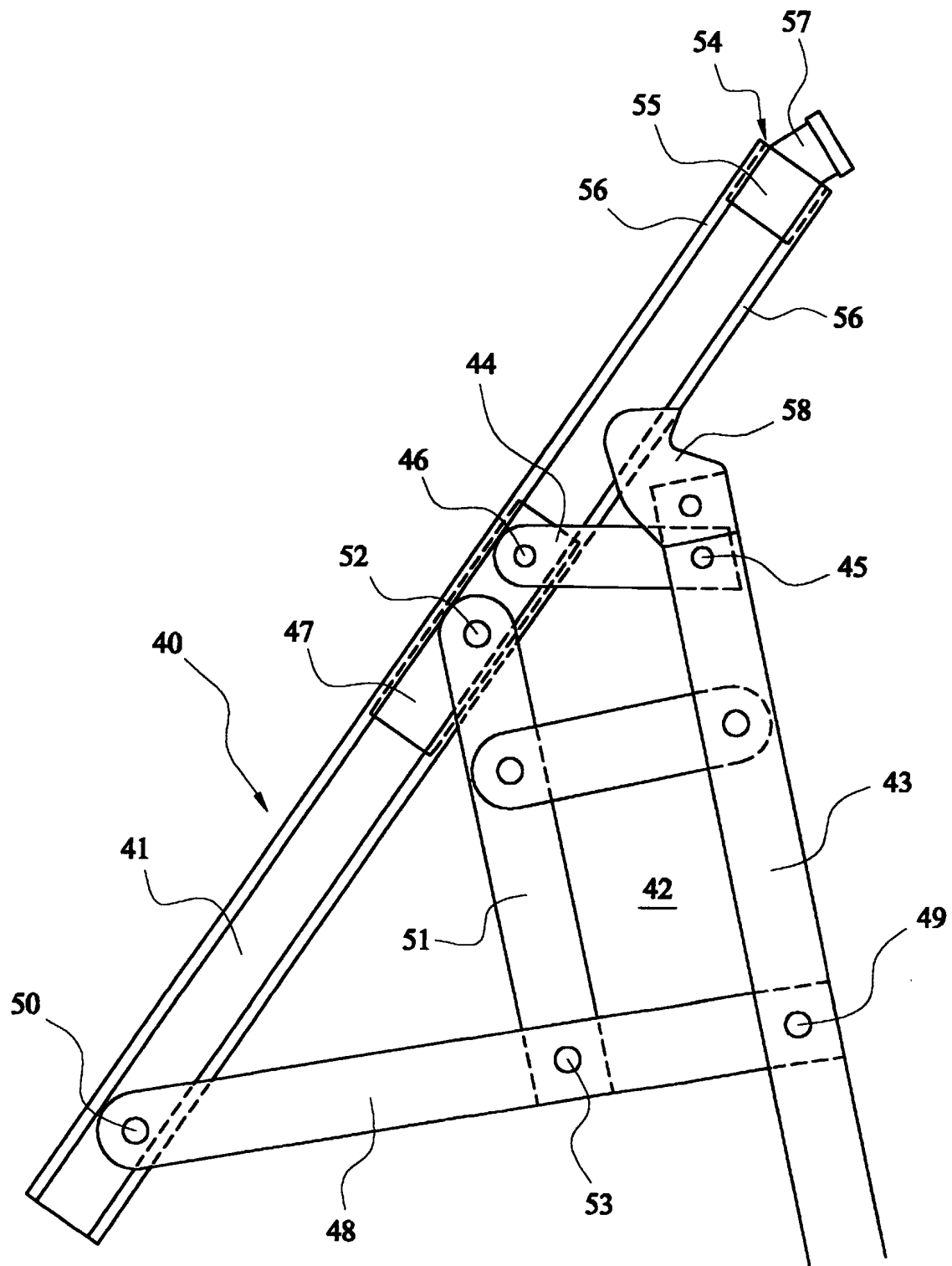


FIG. 1

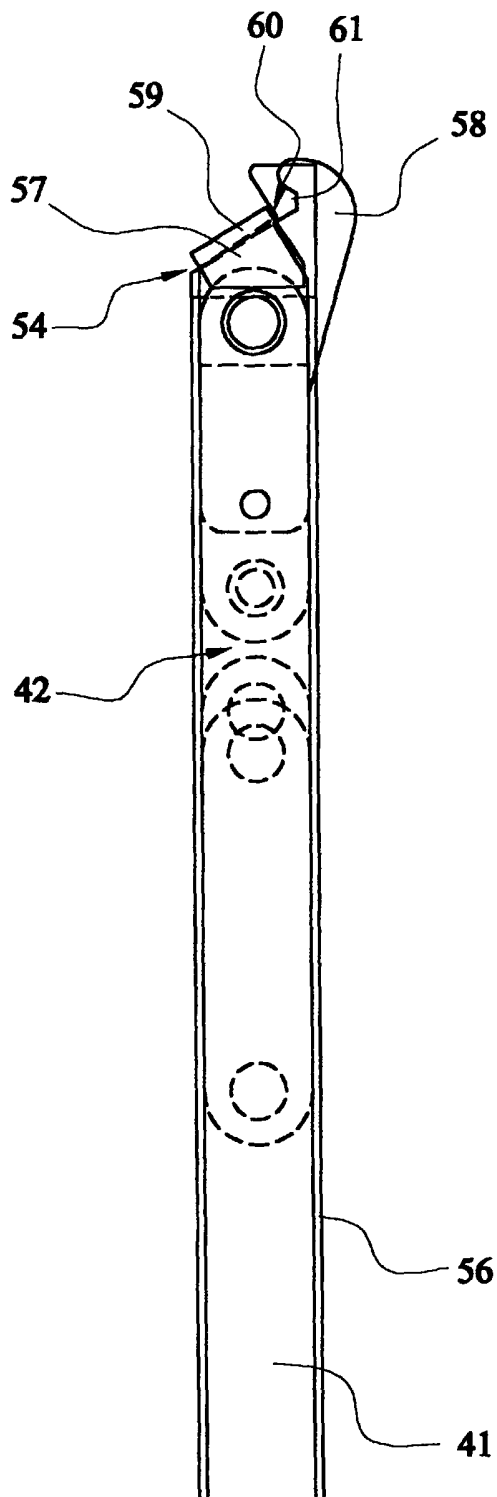


FIG. 2

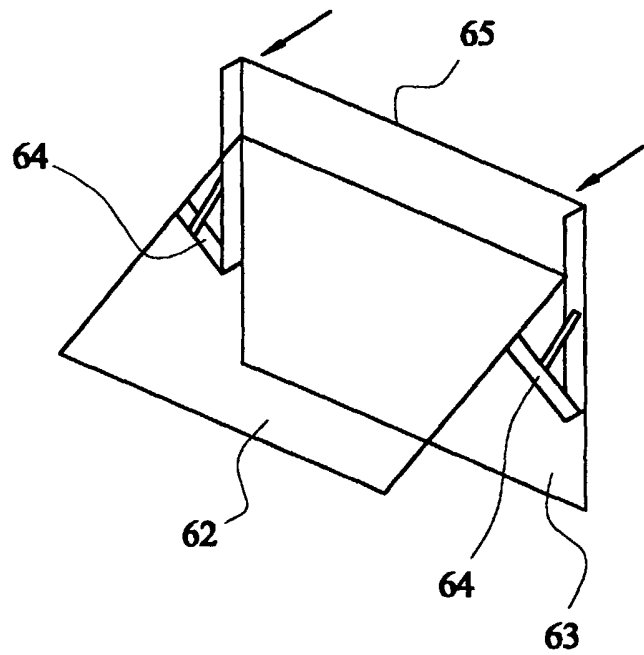


FIG. 3