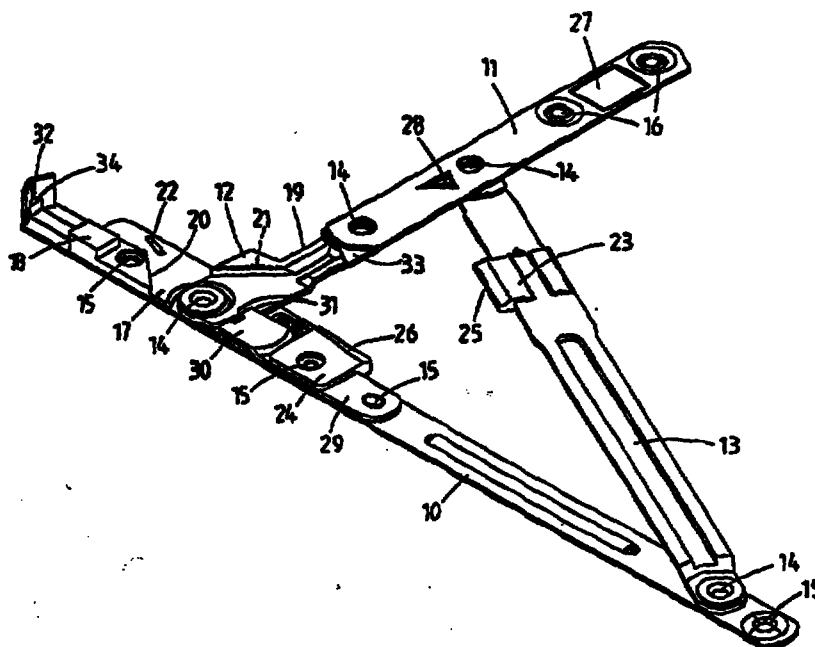




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(21) International Application Number: PCT/NZ95/00093 (22) International Filing Date: 26 September 1995 (26.09.95) (30) Priority Data: 264602 3 October 1994 (03.10.94) NZ (71) Applicant (for all designated States except US): INTERLOCK INDUSTRIES LIMITED [NZ/NZ]; Portsmouth Road, Miramar, Wellington 6003 (NZ). (72) Inventors; and (75) Inventors/Applicants (for US only): HOPE, Robert, Edward [NZ/NZ]; 21 Queen Street, Petone 6008 (NZ). FRAN-CIS, Michael, Gerrard [NZ/NZ]; 354 Fergusson Drive, Heretaunga, Upper Hutt 6007 (NZ). FIGLIOLA, Umberto [GB/NZ]; 2 Darlington Terrace, Miramar, Wellington 6003 (NZ). (74) Agents: HOPKINS, Donald, Leslie et al.; Unit 2, Northcote Office Park, 145 Queen Street, Palmerston North 5330 (NZ).		(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG). Published With international search report.	

(54) Title: A WINDOW STAY



(57) Abstract

A window stay for the adjustable mounting of a window sash in a window frame. The stay comprises a frame mounting plate (10) and a sash mounting plate (11) which are coupled by a short arm (12) and a long arm (13) joined to the mounting plates via pivot joints (14). The open position of the stay is defined by a stop (30) which engages with edge (31) of short arm (12). The stop (30) exhibits a degree of flexibility as it is contacted by the arm (12) to thereby provide an energy absorbing function. A roller (22) is mounted with a pad (17) and engages with the short arm (12) as arm (12) moves to a fully closed position defined by at least edge (19) contacting an upstand (18) of the pad (17).

A WINDOW STAY

This invention relates to a hinge for the adjustable mounting of a window sash in a window frame such hinge commonly
5 referred to in the trade as a window stay.

One of the loadings which is not uncommonly applied to a window stay is an impact loading which occurs as the sash is rapidly moved to a fully opened position. This force can
10 arise due to the sash being blown to the opened position by the wind. The fully opened position is usually determined by at least one element of the window stay (eg an arm) engaging with a stop carried by another element (eg sash and/or frame mounting plate). This impact loading can lead to damage to
15 the stay and/or window sash or frame.

A further loading which is applied to a stay occurs in a casement situation as a consequence of the weight of the sash. This is especially so when heavy sashes need to be
20 supported. This downward force applied by the weight of the sash can lead to wear caused by contact between, say, an arm as it moves over the frame mounting plate. Also in the closed position the static loading applied by the weight of the sash can lead to undesirable loads on some of the
25 components of the stay.

It is an object of the present invention to provide a window stay of a construction which leads to a reduction of undesirable loads applied to the components of the stay.

5 Broadly in one aspect of the invention there is provided a window stay being formed by components comprising at least frame and sash mounting plates and at least one arm pivotally coupled therebetween, the stay having a stop carried by a first of the stay components and engageable with a second
10 stay component which is movable relative to the first stay component, said stop being characterised by having a construction which exhibits a degree of flexibility as it is contacted by said second stay component and thereby provide an energy absorbing function.

15

In a preferred form of the invention the stay also includes a rigid stop which is carried by the first or a third stay component and is contacted by the second or a fourth stay component respectively following at least initial contact
20 occurring between the second stay component and the flexible stop.

According to a second broad aspect of the invention there is provided a window stay comprising at least a mounting plate
25 and an arm pivotally coupled thereto, there being a movable element carried by said mounting plate whereby the arm makes

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contact with and moves over the movable element during final closing of the stay.

In the preferred form of the invention the movable element is
5 a roller. Preferably the roller is mounted with a plastics material contact element carried by the mounting plate and over which the arm moves.

In a preferred form of the invention the stay comprises first
10 and second arms of which the first is shorter, said second arm carrying a riser block which engages between contact surfaces carried by the frame and sash mounting plates as the stay assumes its closed position.

15 In the following more detailed description of the invention which follows reference will be made to the accompanying drawings in which:-

Figure 1 is a top perspective view of a window stay of the four bar type,

20 Figure 2 is a plan view of the stay shown in Figure 1, Figure 3 is an underside perspective view of the stay as illustrated in Figures 1 and 2, and

Figure 4 is a more detailed view on an enlarged scale of the coupling of the short arm to the frame mounting
25 plate.

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In a typical four bar window stay construction the stay as illustrated comprises a frame mounting plate 10, a sash mounting plate 11, a short arm 12 and a long arm 13. The arms are pivotally coupled at their ends to the frame and sash mounting plates via pivots 14 which in the preferred form of the invention are of a friction type such as described and claimed in our New Zealand patent specifications 212534, 230905 and 242877.

10 The frame and sash mounting plates as well as the arms can be formed from a suitable material such as stainless steel. As illustrated the frame and sash mounting plates are each of one piece but can in accordance with known window stay technology be formed as two separate elements with each element having an arm pivotally coupled thereto.

The window stay can be mounted in a window construction by mechanical fastenings passing through the hollow centres of the pivots 14. Additionally, however, openings 15 in frame mounting plate 10 and openings 16 in sash mounting plate 11 can be used to mount the plates to the frame and sash respectively.

Mounted on frame mounting plate 10 and located about pivot 14 of arm 12 to frame mounting plate 10 is a plastics material support pad 17. This pad 17 provides a surface which engages with the underside of arm 12 in accordance with known stay

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technology. This pad 17 provides an upstand 18 which engages with edge 19 of arm 12 when the stay is in the fully closed position and therefore acts as a stop defining the fully closed position. In addition edge 20 of pad 17 engages with
5 surface 21 of arm 12 to provide an additional stop defining the fully closed position.

Mounted with pad 17 is a roller 22 which engages with the underside of arm 12 as arm 12 moves over the roller 22 toward
10 the fully closed position. This roller thus supports the short arm 12 when the window sash with which the stay is coupled moves toward the closed position. The presence of roller 22 reduces wear on the pad 17 and additionally helps reduce sash drop when the stay is in a casement application
15 and carrying heavy sashes.

Arm 13 carries a riser block 23 which engages over a secondary pad 24 carried by frame mounting plate 10. This secondary pad 24 is preferably formed integrally with pad 17.
20 The leading end 25 of riser block 23 is profiled so that if arm 13 has drooped slightly due to the weight of the sash the riser block 23 rides up and onto pad 24. The leading edge 26 of pad 24 can similarly be formed with an inclined surface to assist in a non-binding engagement with riser block 23.

25

An engagement surface 27 is formed in sash mounting plate 11 and this also engages with riser block 23 as the stay moves

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to its fully closed position. Thus in the closed position of the stay the riser block 23 is sandwiched between secondary pad 24 and engagement surface 27. This not only results in support of the weight of the sash but also controls the positioning of the sash in the window frame in the closed position. The support reduces the weight loadings on other components of the stay when the stay is in the closed position. Also as mentioned above the wedge shaped leading edge 25 of the riser block 23 allows a heavy sash to be lifted into the correct position as the sash is closed.

Pressed out of the parent metal of mounting plate 11 is a stop element 28. This engages with the edge of arm 13 so as to define the fully opened position of the stay.

15

However, according to the present invention a second stop is provided with the frame mounting plate 10. This stop comprises a mounting portion 29 which is fixedly attached to frame mounting plate 10. A cranked end 30 locates over pad 17 and engages with edge 31 of short arm 12. This second stop is formed from metal but due to the cranked end 30 being able to move laterally relative to the frame mounting plate 10 and thus constitutes a flexible stop. The stop element could also be formed from a suitable plastics material.

25

Pressed out of, or moulded with, cranked end 30 is a lug 30a which projects forwardly of end 30 to locate beneath arm 12

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when in the stopping position (Figure 4). The reaction of the lug 30a and arm 12 as the cranked end moves laterally provides a limit to the extent of lateral movement.

- 5 Other constructions of stop can be used to provide a stop element which moves, compresses, alters state against a bias etc to achieve a shock absorbing function.

The end of cranked portion 30 is so positioned that it comes
10 into contact with edge 31 of arm 12 prior to stop 28 engaging with the edge of arm 13. Thus the flexible stop operates before the rigid stop 28 and absorbs some of the energy of the moving sash. As a result the load applied to the rigid
15 absorbing stop which enables the stay to withstand higher stopping speeds such as, for example, when the sash is blown fully opened by the wind.

The end of frame mounting plate 10 adjacent pad 17 is
20 provided with a substantially V-shaped upstand 32 with which a projection 33 on the end of sash mounting plate 11 engages as the stay moves to its fully closed position. The interengagement of upstand 32 and projection 33 ensures a correct pull-in action of the sash as the stay moves to its
25 fully closed position. Upstand 32, however, can also include a land 34 which engages with the extreme end of projection 33 to provide a further means of supporting the weight of the



sash in its closed position and thereby reduce the weight loadings on other components in the closed position. This land 34 furthermore serves to strengthen V-shaped upstand 32.

- 5 Consequently as a result of the support achieved by the interaction of riser block 23 with pads 24 and 27; arm 12 with the profile pad 17 and projection 33 with land 34 a more wide spread distribution of the sash weight over the stay components is achieved so that undesirable high loadings on
- 10 one or more components is reduced.

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CLAIMS**THIS SHEET HAS BEEN
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1. A window stay being formed by components comprising at least frame and sash mounting plates (10 and 11) and at least one arm (12) pivotally coupled therebetween, the stay having a stop (30) carried by a first of the stay components (10) and engageable with a second stay component (12) which is movable relative to the first stay component, said stop (30) being characterised by having a construction which exhibits a degree of flexibility as it is contacted by said second stay component (12) and thereby provide an energy absorbing function.
2. A window stay as claimed in claim 1 further including a rigid stop (28) which is carried by the first (10) or a third stay component (11) and is contacted by the second (12) or a fourth stay component (13) respectively following at least initial contact occurring between the second stay component (12) and the flexible stop (30).
3. A window stay as claimed in claim 1 wherein the flexible stop (30) engages with said second stay component (12) as the window stay approaches its fully open position.
4. A window stay as claimed in claim 3 wherein said first stay component (10) carries a second stop (18) which is

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engageable with said second stay component (12) when the window stay is in a fully closed position.

5. A window stay as claimed in any one of preceding claims 1 to 4 wherein the flexible stop comprises a mounting portion (29) substantially rigidly mounted with the first stay component (10) and a stop portion (30) which is movable relative to the first stay component (29).
- 10 6. A window stay as claimed in any one of the preceding claims wherein the first stay component (29) includes a movable element (22) with which the second stay component (12) makes contact with and moves over during final closing of the stay.
- 15 7. A window stay as claimed in claim 6 wherein the movable element is a roller (22).
- 20 8. A window stay as claimed in claim 7 wherein the roller (22) is mounted with a plastics material contact element (17) carried by the first stay component (10) and over which the second stay component (12) moves.
- 25 9. A window stay as claimed in any one of the preceding claims wherein the first stay component (10) is a frame mounting plate and the second stay component (12) is an arm, the stay further including a second and longer arm





(13) coupled to the frame mounting plate (10), said first and second arms being further pivotally coupled to a sash mounting plate (11).

- 5 10. A window stay as claimed in claim 9 wherein the second arm (12) carries a riser block (23) which engages between contact surfaces of the frame (10) and sash mounting plates (13) as the stay assumes its closed position.

10

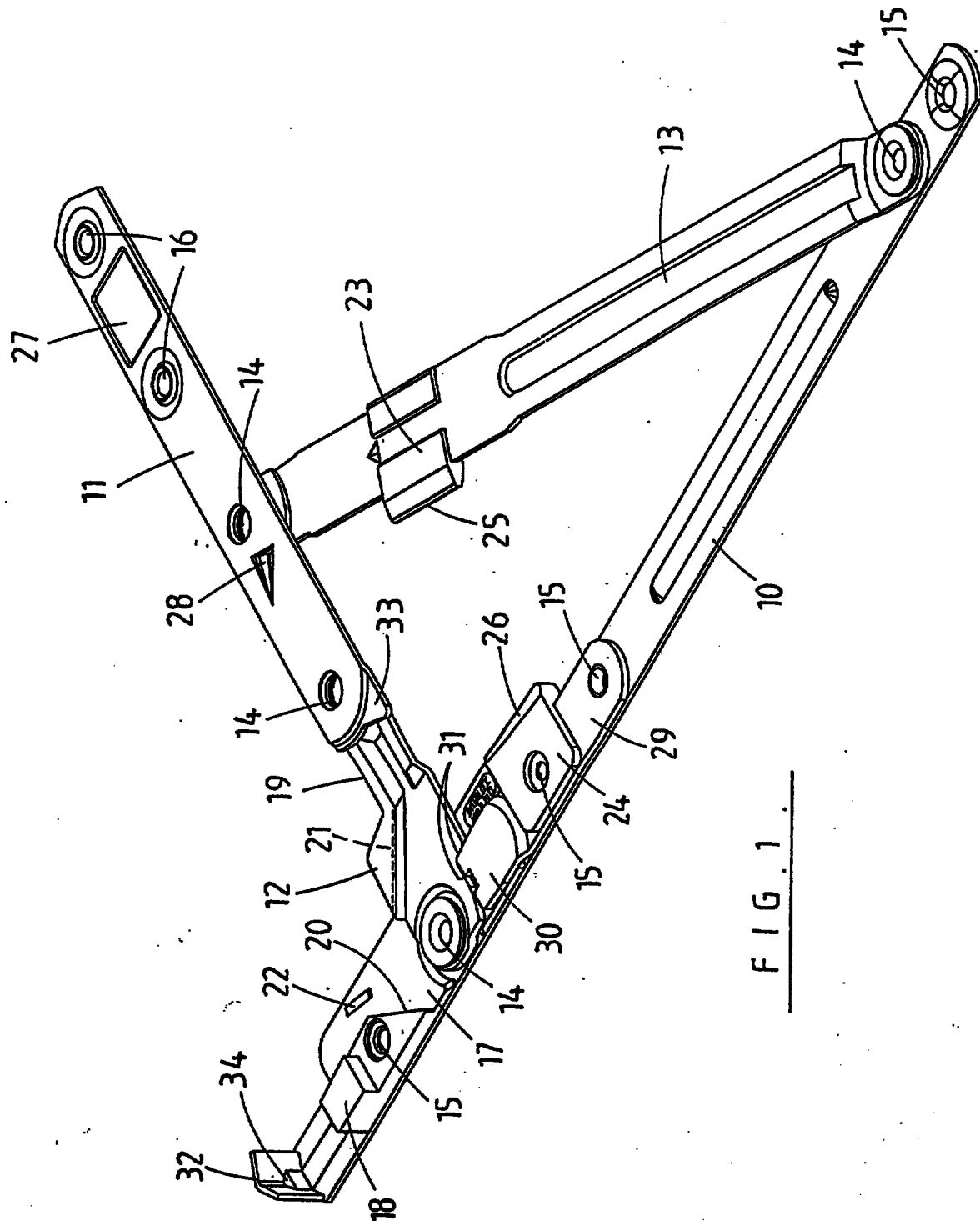
11. A window stay as claimed in claim 10 wherein a substantially V-shaped upstand (32) is provided with the frame mounting plate (10) and a projection (38) of the sash mounting plate (13) inter-engages therewith when
15 the stay moves into the fully closed position, said upstand including a land (34) which engages with said projection (33) in the fully closed position of the stay.

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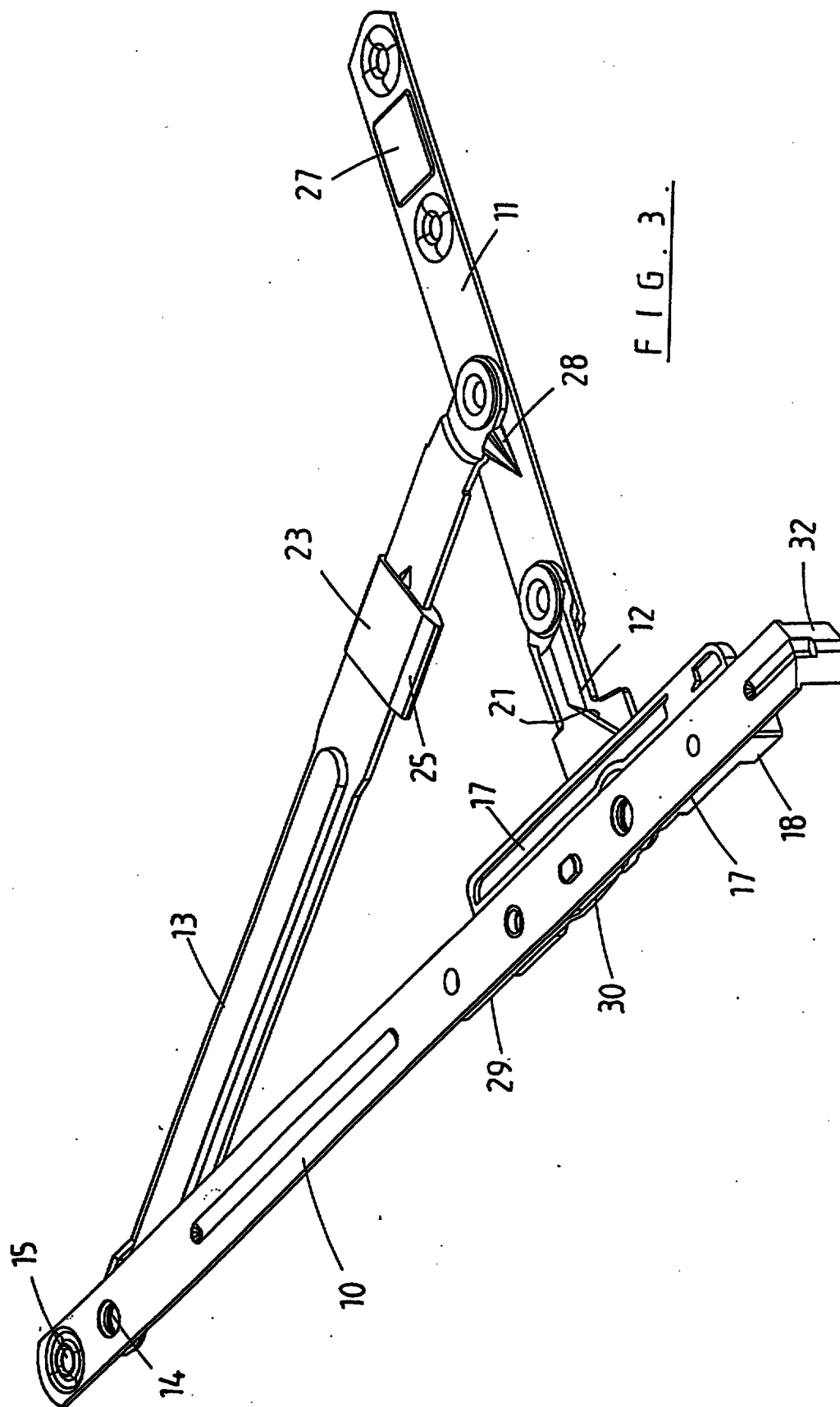


FIG. 3.

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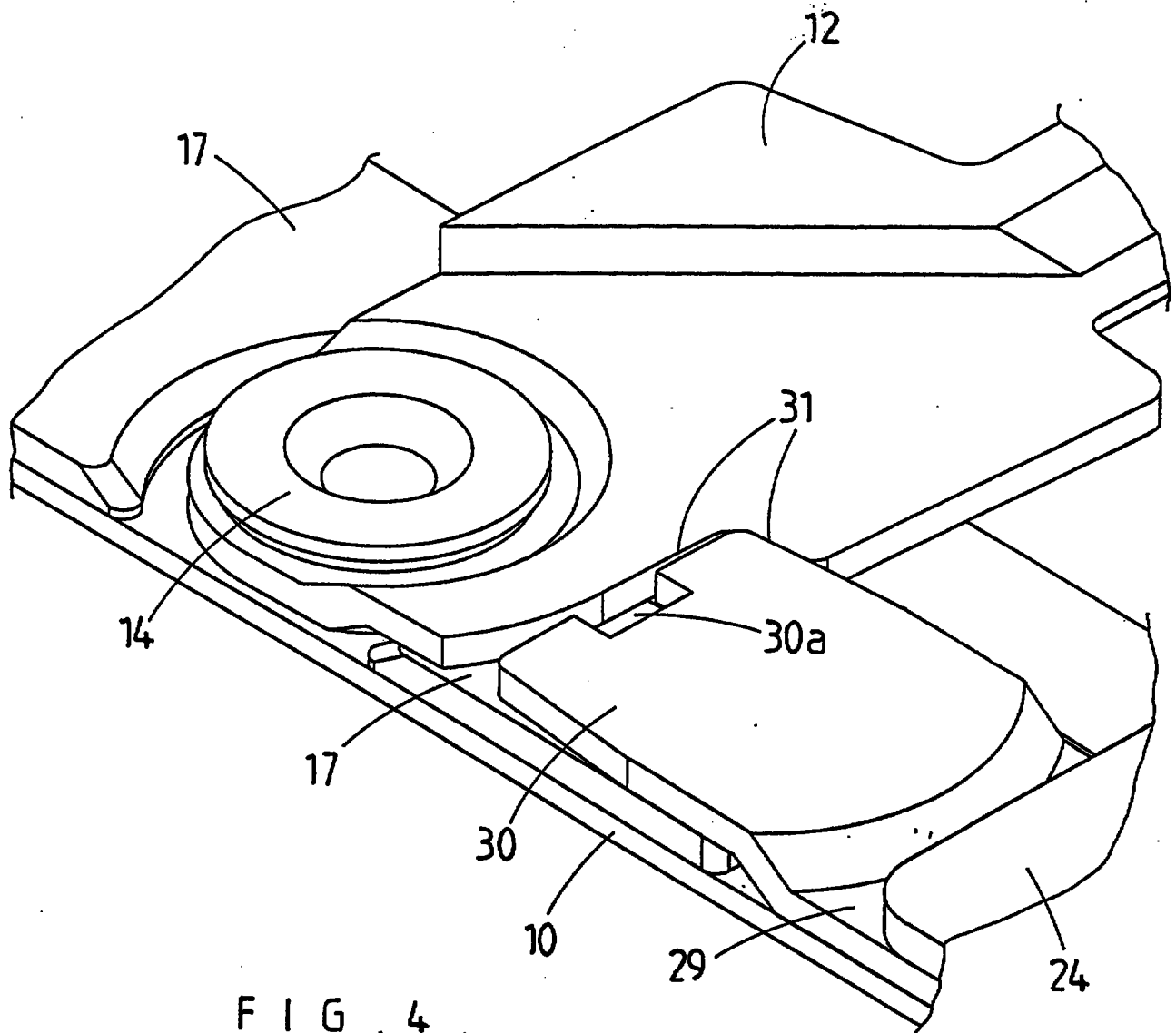


FIG. 4.

It is an object of the present invention to provide a window stay of a construction which leads to a reduction of undesirable loads applied to the components of the stay.

- 5 Broadly in one aspect of the invention there is provided a window stay being formed by components comprising at least frame and sash mounting plates and at least one arm pivotally coupled therebetween, the stay having a stop carried by a first of the stay components and engageable with a second
- 10 stay component which is movable relative to the first stay component when the second stay component approaches a position corresponding to the stay reaching a fully open position, said stop being characterised by having a construction which exhibits a degree of flexibility as it is
- 15 contacted by said second stay component and thereby provide an energy absorbing function.

In a preferred form of the invention the stay also includes a rigid stop which is carried by the first or a third stay

20 component and is contacted by the second or a fourth stay component respectively following at least initial contact occurring between the second stay component and the flexible stop.

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In the preferred form of the invention the movable element is a roller. Preferably the roller is mounted with a plastics material contact element carried by the mounting plate and
5 over which the arm moves.

In a preferred form of the invention the stay comprises first and second arms of which the first is shorter, said second arm carrying a riser block which engages between contact
10 surfaces carried by the frame and sash mounting plates as the stay assumes its closed position.

In the following more detailed description of the invention which follows reference will be made to the accompanying
15 drawings in which:-

Figure 1 is a top perspective view of a window stay of the four bar type,

Figure 2 is a plan view of the stay shown in Figure 1,

Figure 3 is an underside perspective view of the stay as
20 illustrated in Figures 1 and 2, and

Figure 4 is a more detailed view on an enlarged scale of the coupling of the short arm to the frame mounting plate.

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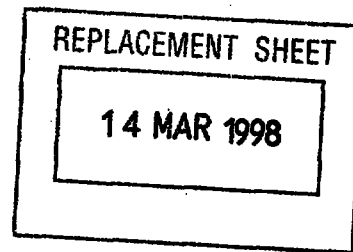
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In a typical four bar window stay construction the stay as illustrated comprises a frame mounting plate 10, a sash mounting plate 11, a short arm 12 and a long arm 13. The arms are pivotally coupled at their ends to the frame and sash mounting plates via pivots 14 which in the preferred form of the invention are of a friction type such as described and claimed in our New Zealand patent specifications 212534, 230905 and 242877.

10 The frame and sash mounting plates as well as the arms can be formed from a suitable material such as stainless steel. As illustrated the frame and sash mounting plates are each of one piece but can in accordance with known window stay technology be formed as two separate elements with each
15 element having an arm pivotally coupled thereto.

The window stay can be mounted in a window construction by mechanical fastenings passing through the hollow centres of the pivots 14. Additionally, however, openings 15 in frame
20 mounting plate 10 and openings 16 in sash mounting plate 11 can be used to mount the plates to the frame and sash respectively.

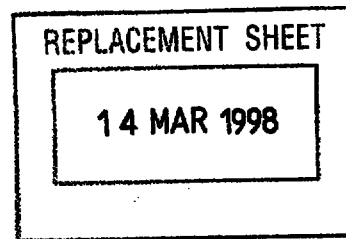
Mounted on frame mounting plate 10 and located about pivot 14
25 of arm 12 to frame mounting plate 10 is a plastics material support pad 17. This pad 17 provides a surface which engages with the underside of arm 12 in accordance with known stay



technology. This pad 17 provides an upstand 18 which in the following description and claims is referred to as the second stop. This second stop engages with edge 19 of arm 12 when the stay is in the fully closed position and therefore acts
5 as a stop defining the fully closed position. In addition edge 20 of pad 17 engages with surface 21 of arm 12 to provide an additional stop defining the fully closed position.

10 Mounted with pad 17 is a roller 22 which engages with the underside of arm 12 as arm 12 moves over the roller 22 toward the fully closed position. This roller thus supports the short arm 12 when the window sash with which the stay is coupled moves toward the closed position. The presence of
15 roller 22 reduces wear on the pad 17 and additionally helps reduce sash drop when the stay is in a casement application and carrying heavy sashes.

Arm 13 carries a riser block 23 which engages over a
20 secondary pad 24 carried by frame mounting plate 10. This secondary pad 24 is preferably formed integrally with pad 17. The leading end 25 of riser block 23 is profiled so that if arm 13 has drooped slightly due to the weight of the sash the riser block 23 rides up and onto pad 24. The leading edge 26
25 of pad 24 can similarly be formed with an inclined surface to assist in a non-binding engagement with riser block 23.



An engagement surface 27 is formed in sash mounting plate 11 and this also engages with riser block 23 as the stay moves to its fully closed position. Thus in the closed position of the stay the riser block 23 is sandwiched between secondary
5 pad 24 and engagement surface 27. This not only results in support of the weight of the sash but also controls the positioning of the sash in the window frame in the closed position. The support reduces the weight loadings on other components of the stay when the stay is in the closed
10 position. Also as mentioned above the wedge shaped leading edge 25 of the riser block 23 allows a heavy sash to be lifted into the correct position as the sash is closed.

Pressed out of the parent metal of mounting plate 11 is a
15 rigid stop element 28. This engages with the edge of arm 13 so as to define the fully opened position of the stay.

However, according to the present invention a stop, which functions as a shock absorbing stop, is provided with the
20 frame mounting plate 10. This stop comprises a mounting portion 29 which is fixedly attached to frame mounting plate 10. A cranked end 30 locates over pad 17 and engages with edge 31 of short arm 12. This shock absorbing stop is formed from metal but due to the cranked end 30 being able to move
25 laterally relative to the frame mounting plate 10 and thus constitutes a flexible stop. The shock absorbing stop could also be formed from a suitable plastics material.

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Pressed out of, or moulded with, cranked end 30 is a lug 30a which projects forwardly of end 30 to locate beneath arm 12 when in the stopping position (Figure 4). The reaction of the lug 30a and arm 12 as the cranked end moves laterally provides a limit to the extent of lateral movement.

Other constructions of stop can be used to provide a shock absorbing stop element which moves, compresses, alters state against a bias etc to achieve a shock absorbing function.

10

The end of cranked portion 30 is so positioned that it comes into contact with edge 31 of arm 12 prior to rigid stop 28 engaging with the edge of arm 13. Thus the shock absorbing stop operates before the rigid stop 28 and absorbs some of the energy of the moving sash. As a result the load applied to the rigid stop 28 is greatly reduced. The overall effect is an energy absorbing stop which enables the stay to withstand higher stopping speeds such as, for example, when the sash is blown fully opened by the wind.

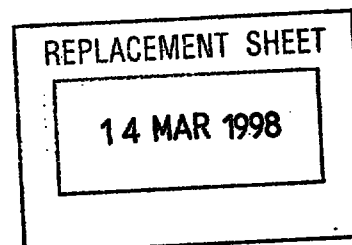
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The end of frame mounting plate 10 adjacent pad 17 is provided with a substantially V-shaped upstand 32 with which a projection 33 on the end of sash mounting plate 11 engages as the stay moves to its fully closed position. The interengagement of upstand 32 and projection 33 ensures a correct pull-in action of the sash as the stay moves to its fully closed position. Upstand 32, however, can also include a land 34 which engages with the extreme end of projection 33

to provide a further means of supporting the weight of the sash in its closed position and thereby reduce the weight loadings on other components in the closed position. This land 34 furthermore serves to strengthen V-shaped upstand 32.

5

Consequently as a result of the support achieved by the interaction of riser block 23 with pads 24 and 27; arm 12 with the profile pad 17 and projection 33 with land 34 a more wide spread distribution of the sash weight over the stay
10 components is achieved so that undesirable high loadings on one or more components is reduced.





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4. A window stay as claimed in any one of preceding claims
1 to 3 wherein the flexible stop comprises a mounting
portion (29) substantially rigidly mounted with the
first stay component (10) and a stop portion (30) which
5 is movable relative to the mounting portion (29).
5. A window stay as claimed in any one of the preceding
claims wherein the first stay component (10) includes a
movable element (22) which the second stay component
10 (12) makes contact with and moves over during final
closing of the stay.
6. A window stay as claimed in claim 5 wherein the movable
element is a roller (22).
- 15 7. A window stay as claimed in claim 6 wherein the roller
(22) is mounted with a plastics material contact element
(17) carried by the first stay component (10) and over
which the second stay component (12) moves.
- 20 8. A window stay as claimed in any one of the preceding
claims wherein the first stay component (10) is formed
by said frame mounting plate and the second stay
component (12) is said at least one arm, the stay
25 further including a second and longer arm (13) coupled
to the frame mounting plate (10), said second arm being
further pivotally coupled to the sash mounting plate
(11).

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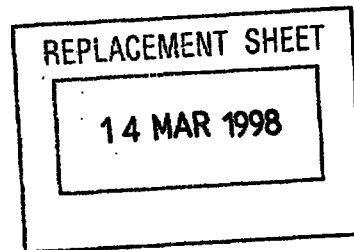
9. A window stay as claimed in claim 8 wherein the second arm (12) carries a riser block (23) which engages between contact surfaces of the frame (10) and sash mounting plates (13) as the stay assumes its closed position.
10. A window stay as claimed in any one of claims 1 to 9 wherein a substantially V-shaped upstand (32) is provided with the frame mounting plate (10) and a projection (38) of the sash mounting plate (13) inter-engages therewith when the stay moves into the fully closed position, said upstand including a land (34) which engages with said projection (33) in the fully closed position of the stay.
11. A window stay as claimed in any one of claims 1 to 3 wherein the flexible stop comprises a mounting portion (29) substantially rigidly mounted with the first stay component (10) and has a cranked end portion (30) which projects from the mounting portion (29) to engage with an edge portion of the second stay component, said cranked end portion being able to move substantially laterally relative to the first stay component (10).

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12. A window stay as claimed in claim 11 further including limit means (30a) to limit the extent of lateral movement of the cranked end portion (30).



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5 5. A window stay as claimed in any one of preceding claims 1 to 3 wherein the flexible stop comprises a mounting portion (29) substantially rigidly mounted with the first stay component (10) and a stop portion (30) which is movable relative to the mounting portion (29).

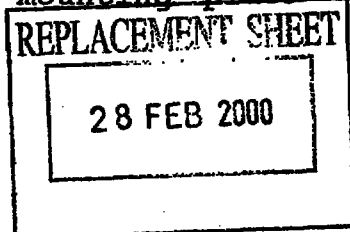
10 6. A window stay as claimed in any one of the preceding claims wherein the first stay component (10) includes a movable element (22) which the second stay component (12) makes contact with and moves over during final closing of the stay.

15 7. A window stay as claimed in claim 5 wherein the movable element is a roller (22).

8. A window stay as claimed in claim 6 wherein the roller (22) is mounted with a plastics material contact element (17) carried by the first stay component (10) and over which the second stay component (12) moves.

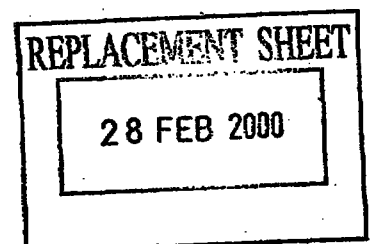
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9. A window stay as claimed in any one of the preceding claims wherein the first stay component (10) is formed by said frame mounting plate and the second stay component (12) is said at least one arm, the stay further including a second and longer arm (13) coupled to the frame mounting plate (10), said second arm being further pivotally coupled to the sash mounting plate (11).





- 10 8. A window stay as claimed in claim 8 wherein the second arm (12) carries a riser block (23) which engages between contact surfaces of the frame (10) and sash mounting plates (13) as the stay assumes its closed position.
- 11 10. A window stay as claimed in any one of claims 1 to 9 wherein a substantially V-shaped upstand (32) is provided with the frame mounting plate (10) and a projection (38) of the sash mounting plate (13) inter-engages therewith when the stay moves into the fully closed position, said upstand including a land (34) which engages with said projection (33) in the fully closed position of the stay.
- 12 11. A window stay as claimed in any one of claims 1 to 3 wherein the flexible stop comprises a mounting portion (29) substantially rigidly mounted with the first stay component (10) and has a cranked end portion (30) which projects from the mounting portion (29) to engage with an edge portion of the second stay component, said cranked end portion being able to move substantially laterally relative to the first stay component (10).





~~13~~ 12. A window stay as claimed in claim 11 further including limit means (30a) to limit the extent of lateral movement of the cranked end portion (30).

