

A HINGE.

This invention relates to hinges, and in particular to a support block for providing increased bearing surface and support for a fixing means between two pivotally arranged components of a sash hinge. The present invention is of particular use in top hung windows. Also provided is a stay open restrictor device. This device allows a sash to remain in an open position until the restricting means is released.

Fixing means for components of a vent hinge are known in the art. These means must allow the components to pivot to open and close the hinge. Fixing means known in the art include riveting, screwing and pinning. When the vent is open the weight of the sash supported by the hinge applies a force to the pivot arrangement of the hinge components. In the designs known in the art, this force is absorbed by the fixing means of the pivot arrangement, which can result in failure of the fixing means. This is a particular problem for the lower most fixing means between a support track and a rotatable component of a hinge in top hung windows. This leads to the frequent failure of these fixing means during testing and, if the hinge is in use to support a heavy sash, increased wear and eventual premature failure of the fixing means could occur. The prior art does not suggest how this situation can be improved.

Accordingly, the present invention aims to provide an improved pivoting arrangement, which reduces this force on the fixing means and spreads the weight of the sash in an improved fashion. More particularly, the present invention provides a hinge for supporting a sash between a closed position, in which it lies within a fixed frame, and an open position in which it extends at an angle to the fixed frame. The hinge comprises: a support track having a first aperture; a link having a second aperture; a support block having a third aperture; the support block being positioned between the support track and the link, and a fixing means which passes through the apertures in the support track, the support block and the link, wherein the support block comprises a body portion and a collar extending from the body portion which circumvent the aperture in the support block, and the collar extends into the aperture in the link such that the link in use bears on the collar rather than the fixing means.

A support block is provided for use in a hinge that supports a sash between a closed position, in which it lies within a fixed frame, and an open position in which it extends at an angle to the fixed frame. The support block may be constructed from any material substantially strong enough to withstand the forces placed on it, and is preferentially
5 constructed from metal, although plastics material may also be acceptable. A metal support block may be constructed from any machining technique known to the skilled person which is suitable for such a purpose, e.g. grinding, drilling, die casting, non-conventional machining techniques, and is preferably die cast.

10 The support block comprises a body portion and a collar extending from the body portion which circumvent an aperture in the support block. The collar is preferably continuous and circular but may also be discrete. The support block is positioned between a support track, preferably comprising a base and two opposing sides having inwardly facing flanges which retain the body portion within the support track, and a
15 link.

The support track and link also each comprise an aperture. A fixing means, e.g. a rivet or a screw, preferably a rivet, is provided that passes through all three aforementioned apertures and is fixed to the support track. The collar of the support block extends into
20 the aperture in the link. The body portion is held fixedly in position by the fixing means and the inwardly facing flanges of the support track and thus prevents the support block from rotating. Optionally, the body portion includes a recess into which the support track base is deformed when, for example, a rivet is applied to the system. This strengthens the location of the support block and hence the pivot.

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The support track, support block, link and fixing means comprise a pivot arrangement, wherein the support track is fixedly mounted to a frame by a number of screws or the like through keyways and mounting apertures, and wherein the link rotates about the collar and the fixing means. In this way, the force on the fixing means is reduced and
30 the weight of the sash bears, through the link in use, and the collar and body portion of the support block, to the support track. Consequently, the support block provides increased bearing surface and support for the fixing means. When the vent is open, a force is also applied perpendicular to the support track that in conventional pivot

arrangements would be supported almost entirely by the fixing means. In the present invention, this force also bears through the collar and body portion of the support block, which is prevented from rotating by the fixing means and the inwardly facing flanges of the support track, to the support track.

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The improved pivot arrangement of this invention is described herein in particular relation to the pivot arrangement between the support track and the link of a hinge. However, it is within the scope of the person skilled in the art to realise that this pivot arrangement could be used between any pivotally arranged components of a hinge to
10 reduce the forces applied to the fixing means of that pivot arrangement.

A stay open restrictor device is also provided for preventing closure of a sash into a fixed frame.

15 Stay open restrictor devices are known in the art. These devices allow the sash to remain in an open position until the restricting means is released.

The stay open restrictor device of the present invention comprises: a support track; a slider for sliding along the support track; a restricting link for connecting the support
20 track to a sash, and restricting means for restricting the motion of the slider.

The support track of the stay open restrictor device is preferably the same support track as that of the hinge described hereinbefore. However, it is within the scope of the skilled person to realise that the stay open restrictor device described herein would also function
25 if the support track of the stay open restrictor device were separate from the support track of the hinge. Indeed, if the two support tracks were different, it is clear that the stay open restrictor device could be used regardless of the type of hinge fitted to the sash. The support track of the stay open restrictor device may be manufactured from any suitable material but is preferably metal, e.g. steel.

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A restricting link is also provided. One end of the restricting link is pivotally attached to the slider using any suitable method, e.g. a screw, a pin, a rivet, and preferably using a rivet. The slider may take the form of the support block described herein with a body

portion and a collar for extending into the restricting link for additional strength. The end of the restricting link furthest from the slider can be connected directly to the sash. Optionally, the stay open restrictor device may further comprise a sash plate, which is pivotally connected to the restricting link. The sash plate may be attached to the sash by
5 any suitable means, e.g. a screw, a pin, a rivet. The restricting link and sash plate may be manufactured from any suitable material but is preferably metal, e.g. steel.

The slider of the stay open restrictor device is positioned between the support track, which preferably comprises a base and two opposing sides having inwardly facing
10 flanges that retain the slider, and the restricting link. The slider and the restricting link are pivotally connected. The slider is allowed to slide along the support track, whilst being maintained on the track via the inwardly facing flanges. The slider may be made from any material but is preferentially made from metal, e.g. steel, with a plastics skin to prevent wear between the slider and the track.

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The restricting means is also attached to the slider, or carried thereby preferably via any suitable means, e.g. a screw, a pin, a rivet. The restricting means can be manufactured from any suitable material, but is preferentially made from metal or a plastics material. The restricting means restricts the motion of the slider along the support track thus
20 allowing the sash to be fixed open in one or more different positions.

The present invention is described with reference to the accompanying drawings in which:

Figure 1 comprises:

- 25 Figure 1a illustrating a plan and side view of the hinge of the present invention;
Figure 1b illustrating an asymmetric end point of the sash arm;
Figure 1c illustrating a tapered lead on a slider ear;
Figure 1d illustrating a cross section through D-D of Figure 1a;
Figure 1e illustrating an installation keyway;
30 Figure 1f illustrating the way in which the components of this embodiment are fitted together;
Figure 1g illustrating the restricting means of this embodiment.

Figure 2 comprises:

Figure 2a illustrating a plan and side view of the hinge of the present invention;

Figure 2b illustrating an asymmetric end point of the sash arm;

Figure 2c illustrating an end stop for the slider tail;

Figure 2d illustrating a cross section through D-D of Figure 2a;

5 Figure 2e illustrating an installation keyway;

Figure 2f illustrating the way in which the components of this embodiment are fitted together;

Figure 2g illustrating the restricting means of this embodiment.

Figure 3 comprises:

10 Figure 3a illustrating a plan and side view of the hinge of the present invention;

Figure 3b illustrating an asymmetric end point of the sash arm;

Figure 3c illustrating an installation keyway;

Figure 3d illustrating a cross section through D-D of Figure 3a;

Figure 3e illustrating the way in which the components of this embodiment are fitted

15 together;

Figure 3f illustrating the restricting means of this embodiment.

Figure 4 comprises:

Figure 4a illustrating a stay open restrictor device of the present invention;

Figure 4b illustrating a device for limiting opening of the stay open restrictor device;

20 Figure 4c illustrating the slider and restricting means sliding along the support track.

With reference to the drawings, the present invention provides a support block (1) which is a significant improvement over the known prior art as described above. The support block (1) is positioned between a support track (2) and a link (3). The support block (1) comprises a body portion (4) with a collar (4a) extending from the body portion (4). The support track (2) comprises a base (6) and two sides (7) having inwardly facing flanges (8) which retain the body portion (4) of the support block (1) in the support track (2). Both the collar (4a) and the body portion (4) circumvent an aperture in the support block (1). The aperture in the support block (1) is axially aligned with respect to an aperture in the support track (2) and an aperture in the link (3) with the collar (4a) of the support block (1) extending into the aperture of the link (3). The link (3), support block (1) and support track (2) are held together by a fixing means (5), in this case a rivet, which acts as a pivot. The body portion (4) includes a recess (4b) into which the support track (2) is

deformed when the rivet is applied to the system. Together, the link (3), the support block (1), the support track (2) and the fixing means (5) comprise a pivot arrangement, wherein on opening the vent the link (3) rotates around the collar (4a) of the support block (1). The force applied by the sash load, especially in top hung windows, is placed
5 on this pivot arrangement and, in the absence of the collar (4a), would be supported entirely by the fixing means (5). However, in the present invention, this force is supported almost entirely by the support block (1) through the distribution of the force through the collar (4a) and the body portion (4) to the support track (2). Thus the support block (1) increases the bearing surface and the support of the pivot arrangement.

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The support track (2) is fixed to a frame (not shown) by a number screws or the like through the keyway(s) (32) provided and mounting apertures (31).

In the specific embodiments shown in the Figures, in addition to the pivot arrangement,
15 the hinge comprises a sash arm (9), which is pivotally attached through a further link (10) to a slider (11), retained in the support track (2) by the inwardly facing flanges (8). The sash arm (9) is fixed to the sash (not shown) by a number of screws or the like through the mounting apertures (9a) provided. The slider (11) is provided with apertures to accept rivets (12, 13), which connect the further link (10) and a pivotally attached
20 brace (17). The rivets are preferably flat headed rivets. In addition, the sash arm (9) is pivotally attached (14) at its other end to the link (3). The sash arm (9) includes an asymmetric end point (15), which engages in a corresponding end cap (16) on the support track (2) when the hinge is closed. The brace (17) is also pivotally attached (18) to the link (3).

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A further option of the present invention is a choice of restricting means on the slider (11) that engages the support track (2) at a plurality of locations. The restricting means is integral with the slider (11). The restricting means allows the sash arm (9) to be fixedly positioned at a plurality of angles relative to the support track (2) resulting in the
30 sash having a plurality of open positions.

In a first embodiment, illustrated in Figure 1, the restricting means comprises a slider tail (19) and a release lever (20) with two pairs of opposing ears (21, 21a) extending

perpendicular thereto. The slider tail (19) extends from the slider (11), near to the support track base (6) towards the support block (1). While two pairs of ears (21, 21a) are described here, it is within the scope of the skilled person to realise that a single ear, a single pair of opposing ears or a plurality of pairs opposing ears could also act as a restricting means. The slider tail (19) and release lever (20) are preferably formed of metal, for example steel. However, the release lever (20) could also be formed from plastics material. The opposing ears (21) closest to the support block (1) comprise a tapered lead (23), which causes the release lever (20) to dive under the flange from a large cut out region (22a) when the hinge is initially opened. The opposing ears (21a) closest to the slider (11) are not tapered. The two sets of opposing ears (21, 21a) engage opposing cut out regions (22) in the flanges (8) of the support track (2) at a plurality of positions. On opening the hinge, the slider (11) moves along the support track (2) towards the support block (1) until the opposing ears (21, 21a) engage cut out regions (22) in the flanges (8). The hinge is then prevented from either opening or closing by the non-tapered ears (21a) until the release lever (20) is depressed and disengages ears (21a). Thus the hinge, and hence the sash, is held in a fixed position. While a plurality of opposing cut out regions has been described here, it is within the scope of the skilled person to realise that a single opposing cut out region would allow for a single intermediate open angle for the hinge.

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In a second embodiment, illustrated in Figure 2, the restricting means comprises a plurality of pairs of opposing teeth (24) positioned on to the slider tail (19) and extending perpendicular thereto. The opposing teeth (24) engage opposing sprung jaws (25) fixedly mounted to the inside of the support track (2). The sprung jaws (25) are preferably formed from metal, for example steel. On opening the hinge, the slider (11) moves along the support track (2) towards the support block (1), as in embodiment 1, until a pair of teeth (24) engage the sprung jaws (25). The hinge is then prevented from either opening or closing until a sufficient force is applied causing the sprung jaws (25) to flex back and release the slider tail (19). The plurality of open angles for the hinge, correspond to the plurality of pairs of opposing teeth (24) positioned on the slider tail (19). While a plurality of teeth (24) has been described here, it is within the scope of the skilled person to realise that a single pair of opposing teeth (24) would allow for a single intermediate open angle for the hinge.

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In a third embodiment, illustrated in Figure 3, the restricting means comprises a leaf spring (26), attached at one end (27), by the rivet (12), to the base of slider (11). The leaf spring (26) is in contact with the support track base (6). The other end of the leaf spring (29) floats freely allowing it to travel forward as the spring (26) is compressed, or backwards as the spring (26) is extended depending on the end of the slider (11) to which the spring (26) is fixedly attached. The leaf spring (26) engages a plurality of cut out sections in the support track base (6). It is within the scope of the skilled person to realise that this restricting means would operate irrespective of whether the leaf spring (26) were attached to the rivet (12) or the rivet (13). On opening the hinge, the slider (11) moves along the support track (2) towards the support block (1), as in embodiments 1 and 2, until the leaf spring (26) engages a cut out section in the support track base (6). The hinge is then prevented from either opening or closing until a sufficient force is applied causing the leaf spring (26) to be flexed and removed from the cut out section. The plurality of open angles for the hinge, correspond to the plurality of cut out sections in the support track base (6). While a plurality of cut out sections has been described here, it is within the scope of the skilled person to realise that a single cut out section would allow for a single intermediate open angle for the hinge.

The hinges of Figures 1 and 2 also comprise a crack stop (30) positioned on the support track base (6). At the hinge's maximum opening, the end of the release lever (20) in embodiment 1, or the end of the slider tail (19) in embodiment 2, butts against the crack stop (30). This avoids over opening of the hinge, which would result in excess stress on the hinge.

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Keyways (32) are positioned in the support track base (6), to the inside of the link (3) and end cap (16) attachment, for ease of installation.

A stay open restrictor device (33) is also provided, an embodiment of which is shown in Figure 4. In this embodiment, the stay open restrictor device (33) comprises a slider (11) mounted on a support track (2). The support track (2) comprises a base (6) and two sides (7) having inwardly facing flanges (8) which retain the slider (11) in the support track. Thus the slider is free to move along the support track (2). The stay open restrictor

device (33) further comprises a restricting link (35), which is pivotally mounted on the slider (11). A sash plate (37) is pivotally mounted to the end of the restricting link (35) that is furthest from the slider (11). This sash plate (37) is further attached to the sash (not illustrated) using the apertures (39, 42) provided on the sash plate (37). A
5 restricting means (20) is attached to the end of the slider (11) furthest from the restricting link (35).

In this embodiment the restricting means comprises a release lever (20a) with pair of opposing ears (21b) extending perpendicular thereto. The release lever (20a) extends
10 from the slider (11), towards one end (43) of the support track (2). The slider (11) and release lever (20a) are preferably formed of metal, for example steel. However, the release lever (20a) could also be formed from plastics material. The opposing ears (21b) comprise a tapered lead (23a), which causes the release lever (20a) to dive under the flange (8) from a cut out region (22b) when the sash is initially opened. The opposing
15 ears (21b) comprise a non-tapered tail end. The set of opposing ears (21b) engage opposing cut out regions (22c) in the flanges (8) of the support track (2) at a maximum opening position. On opening the sash, the slider (11) moves along the support track (2) away from end (43) until the opposing ears (21b) engage cut out regions (22c) in the flanges (8). The sash is then prevented from closing by the non-tapered tail end of the
20 ears (21b) until the release lever (20a) is depressed and disengages the ears (21b). Thus the stay open restrictor device, and hence the sash, is held in a fixed open position. While single opposing cut out regions have been described here, it is within the scope of the skilled person to realise that a plurality of opposing cut out regions would allow for a plurality of intermediate fixed open angles for the sash.

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While one pair of ears (21b) are described here, it is within the scope of the skilled person to realise that a single ear, two pairs of opposing ears, as illustrated in Figure 1g, or a plurality of opposing ears could also be used. In the embodiment illustrated in Figure 1g, the restricting means comprises a slider tail (19) and a release lever (20) with
30 two pairs of opposing ears (21, 21a) extending perpendicular thereto. When this restricting means is applied to the stay open restrictor device (33), the slider (11), support track (2) and restricting link (35) are as shown in Figure 4(a). The slider tail (19) extends from the slider (11), near to the support track base (6) away from end (43).

While two pairs of ears (21, 21a) are described here, it is within the scope of the skilled person to realise that a single ear, a single pair of opposing ears, as in Figure 4, or a plurality of pairs opposing ears could also act as a restricting means. The slider tail (19) and release lever (20) are preferably formed of metal, for example steel. However, the release lever (20) could also be formed from plastics material. The opposing ears (21) closest to the restricting link (35)/slider attachment comprise a tapered lead (23), which causes the release lever (20) to dive under the flange from a large cut out region (22b) when the sash is initially opened. The opposing ears (21a) closest to the slider (11) are not tapered. The two sets of opposing ears (21, 21a) engage opposing cut out regions (22c) in the flanges (8) of the support track (2). On opening the sash, the slider (11) moves along the support track (2) away from end (43) until the opposing ears (21, 21a) engage cut out regions (22c) in the flanges (8). The sash is then prevented from either opening or closing by the non-tapered ears (21a) until the release lever (20) is depressed and disengages ears (21a). Thus the stay open restrictor device, and hence the sash, is held in a fixed position. While a plurality of opposing cut out regions has been described here, it is within the scope of the skilled person to realise that a single opposing cut out region would allow for a single intermediate open angle for the sash.

In a further embodiment, the restricting means of the stay open restrictor device can be the restricting means shown in Figure 2g. When this restricting means is applied to the stay open restrictor device (33), the slider (11), support track (2) and restricting link (35) are as shown in Figure 4(a). In this embodiment, the restricting means comprises a slider tail (19) that extends from the end of the slider (11) furthest from the restricting link. The restricting means further comprises a plurality of pairs of opposing teeth (24) positioned on to a slider tail (19) and extending perpendicular thereto. The opposing teeth (24) engage opposing sprung jaws (25) fixedly mounted to the inside of the support track (2). The sprung jaws (25) are preferably formed from metal, for example steel. On opening the sash, the slider (11) moves along the support track (2) away from end (43), as in the previous embodiments, until a pair of teeth (24) engage the sprung jaws (25). The sash is then prevented from either opening or closing until a sufficient force is applied causing the sprung jaws (25) to flex back and release the slider tail (19). The plurality of open angles for the sash correspond to the plurality of pairs of opposing teeth (24) positioned on the slider tail (19). While a plurality of teeth (24) has been described

here, it is within the scope of the skilled person to realise that a single pair of opposing teeth (24) would allow for a single intermediate open angle for the sash.

In a final embodiment, the restricting means of the stay open restrictor device can be the
5 restricting means shown in Figure 3f. When this restricting means is applied to the stay
open restrictor device (33), the slider (11), support track (2) and restricting link (35) are
as shown in Figure 4(a). The restricting means of this embodiment comprises a leaf
spring (26), attached at one end (27) by a rivet (12) to the base of slider (11). The leaf
spring (26) is in contact with the support track base (6). The other end of the leaf spring
10 (29) floats freely allowing it to travel forward as the spring (26) is compressed, or
backwards as the spring (26) is extended depending on the end of the slider (11) to
which the spring (26) is fixedly attached. The leaf spring (26) engages a plurality of cut
out sections in the support track base (6). On opening the sash, the slider (11) moves
along the support track (2) away from end (43), as in the previous embodiments, until
15 the leaf spring (26) engages a cut out section in the support track base (6). The sash is
then prevented from either opening or closing until a sufficient force is applied causing
the leaf spring (26) to be flexed and removed from the cut out section. The plurality of
open angles for the sash, correspond to the plurality of cut out sections in the support
track base (6). While a plurality of cut out sections has been described here, it is within
20 the scope of the skilled person to realise that a single cut out section would allow for a
single intermediate open angle for the sash.

The stay open restrictor devices of Figure 4 also comprise crack stops (30a, 30b)
positioned on the support track base (6). At the sash's maximum opening, the end of the
25 slider (11) butts against the crack stop (30a). This avoids over opening of the hinge,
which would result in excess stress on the hinge. Crack stop (30b) is included to prevent
the slider (11) falling off the end of the track during assembly.

Apertures (41) are positioned at the ends of the support track base (6) for attachment of
30 the support track (2) of the stay open restrictor device to the fixed frame of the vent (not
illustrated).

It is clear that the stay open restrictor device (33) of Figure 4 can be used as a restrictor device for a sash in conjunction with any hinge, including the hinge described herein.

It will of course be understood that the present invention has been described above
5 purely by way of example, and that modifications of detail can be made within the scope of the invention.

Claims

1. A hinge for supporting a sash between a closed position, in which it lies within a fixed frame, and an open position in which it extends at an angle to the fixed frame, the hinge comprising:
 - 5 a support track having a first aperture,
 - a link having a second aperture,
 - a support block having a third aperture, the support block being positioned between the support track and the link, and
 - 10 a fixing means which passes through the apertures in the support track, the support block and the link, wherein
 - the support block comprises a body portion and a collar extending from the body portion which circumvent the aperture in the support block, and the collar extends into the aperture in the link such that the link in use bears on the collar rather than the fixing
 - 15 means.
2. A hinge as claimed in claim 1, wherein the support block is die cast metal.
3. A hinge as claimed in claim 1 or 2, wherein the fixing means is a rivet.
- 20 4. A hinge as claimed in any one of the preceding claims, wherein the collar is circular.
5. A hinge as claimed in any one of the preceding claims, wherein the body portion
- 25 has a recess for receiving the support track.
6. A hinge as claimed in any one of the preceding claims, wherein the support track comprises a base and two opposing sides having inwardly facing flanges which retain the body portion within the support track.
- 30 7. A hinge as claimed in any one of the preceding claims, further comprising a slider mounted on the support track.

8. A hinge as claimed in claim 7, wherein a restricting means is present on the slider that engages the support track at a plurality of locations allowing the hinge to be fixedly positioned at a plurality of angles.
- 5 9. A stay open restrictor device for preventing closure of a sash into a fixed frame, the stay open restrictor device comprising:
- a support track,
 - a slider for sliding along the support track,
 - a restricting link for connecting the support track to a sash, and
 - 10 restricting means for restricting motion of the slider.
10. A stay open restrictor device as claimed in claim 9, wherein the base track comprises a base and two opposing sides having inwardly facing flanges which retain the slider within the support track.
- 15 11. A stay open restrictor device as claimed in claim 9, further comprising a sash plate which is pivotally connected to the restricting link.
12. A hinge or stay open restrictor device as claimed in any one of claims 8-10, wherein the restricting means is released through depression of a release lever.
- 20 13. A hinge or stay open restrictor device as claimed in any one of claims 8-11, wherein the restricting means is provided by the slider additionally including a release lever comprising at least one pair of opposing ears for engaging opposing cut out regions in the flanges of the support track.
- 25 14. A hinge or stay open restrictor device as claimed in claim 12, wherein the release lever comprises two pairs of opposing ears for engaging opposing cut out regions in the flanges of the support track.
- 30 15. A hinge or stay open restrictor device as claimed in claim 13, wherein the pair of ears closest to the support block or restricting link are tapered.

16. A hinge or stay open restrictor device as claimed in any one of claims 8-10, wherein the restricting means is provided by the slider additionally including a slider tail comprising at least one pair of opposing teeth engaging opposing sprung jaws fixedly mounted to the side of the support track.
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17. A hinge or stay open restrictor device as claimed in any one of claims 8-10, wherein the restricting means is provided by the slider additionally comprising a leaf spring engaging a cutout section in the base of the support track.
- 10 18. A hinge or stay open restrictor device as claimed in claim 7-16, wherein a crack stop is positioned on the base of the support track at the hinge's maximum opening.
- 15 19. A hinge or stay open restrictor device as claimed in claim 15 or 16, wherein the restricting means is released through application of a sufficient opening or closing force on the sash.
20. A hinge as claimed in any one of the preceding claims, further comprising a brace attached to the slider and the link.
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21. A hinge as claimed in any one of the preceding claims, further comprising a sash arm attached to the slider via a further link.
- 25 22. A hinge as claimed in any one of the preceding claims, wherein the sash arm includes an asymmetric end point which engages in a corresponding end cap on the support track when the hinge is closed.
- 30 23. A hinge as claimed in any one of the preceding claims for use in a top hung window.
24. A hinge or stay open restrictor device substantially as hereinbefore described with reference to and as shown in the accompanying drawings.