A clip assembly may safely secure sliding sashes of a window or door during transportation, and, in one embodiment, be comprised of a strap member and a pawl member. The strap member may be comprised of a bumper portion, and a strap portion extending therefrom, where the strap portion may have a plurality of teeth formed within the thickness of the strap. The pawl member may have a pair of sidewalls supported by a top wall and an intermediate wall. The top wall may have a protrusion which includes a plurality of pawl teeth formed to complement the strap teeth, and be located proximate to the intermediate wall. The strap may be introduced through the gap between the top rail of an upper sash and bottom rail of the second sash, to then be inserted into the pawl, and thereby be retained by the respective teeth to secure the sashes.
SASH WINDOW AND DOOR TRANSPORTATION CLIP

[0001] This application claims priority on U.S. Provisional Application Ser. No. 61/284,244 filed on Dec. 15, 2009, the disclosures of which are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to improvements in the means for shipping sliding and tiltable sash windows, and more particularly to apparatus which relieve the stresses imposed on the window’s sash locks during transportation.

BACKGROUND OF THE INVENTION

[0003] There are many different window types available on the market, such as picture windows, bay windows, skylight windows, louvered windows, transom windows, casement windows, and the many versions of the sash window, with those being single-hung, double-hung, vertical sliding, and horizontal sliding sash windows. While the casement window is predominantly used in the United Kingdom and much of Europe, the sliding sash window remains an American favorite for both new construction and for replacement windows.

[0004] Many developments made in sliding sash windows are design changes that relate to improved functionality in the manufacture and/or operation of the windows, particularly with respect to its latches and hinges. However, there has been a long-lived but unmet need to improve the traditional methods of safely shipping sliding sash windows.

[0005] To prevent damage to either or both sashes due to uncontrolled sliding, the windows are normally transported with both sashes being latched. However, because of the bouncing and jarring motion including vibrations that are experienced during its transportation, a great deal of stress is placed on the lock and keepers of the window as well as the screws holding the locks and keepers in place. This stress can cause the locks and keepers to become broken or fractured and may also cause the screws to become dislodged from the sash. Such damage can result whether transportation is accomplished using freight cars on a railroad, or by a tractor-trailer on the nation’s highways.

[0006] Window manufacturers attempt to address this problem in one of a number of different ways. One way is to insert blocking, made from cardboard, Styrofoam or any number of various packaging materials, materials, to support the sash windows, while other manufacturers will ship the windows in the closed position but with the sashes unlocked, and with some outer packaging solely relied upon to hold the sashes in place. But this is cumbersome and costly, not only in terms of the purchasing and needed supply of bulky packing materials, but also for its disposal.

[0007] Another method is to open the sash window, and to turn and pack the window upside-down. However, this method creates the potential risk of damage to the window sashes and frame from sliding motion, and furthermore makes the window awkward to maneuver and handle. Another solution is to ship the windows closed and locked, and to use air ride type cargo vans and trailers to reduce the stress to the hardware, with a corresponding increase in shipping costs.

[0008] This invention provides an economical and simple solution for the transportation of sash windows and doors through the use of a serrated strap. There has been some limited use of serrated straps in the art. In U.S. Pat. No. 5,852,852 to Rigal, it was used in combination with a ratchet locking member as a tightening device, with particular applicability for snowboard bindings, roller skates and the like. The Rigal patent improved upon the prior art use of serrated straps, such as those found, for example, in U.S. Pat. No. 5,480,176 to Sims for an externally mounted binding, as well as the Ratchet-type Buckle shown by U.S. Pat. No. 5,416,952 to Dodge. However, all of these types of devices require the use of a separate pivoting ratchet element in combination with the serrated strap.

[0009] U.S. Pat. No. 5,462,542 to Alesi discloses a more simple arrangement in the form of a “Sternum Buckle With Serrated Strap.” The Alesi sternum buckle assembly is adapted to be looped about the split portions of tissue. The serrated strap extends outward from the pawl in a single piece that is formed of a bio-absorbable material. Similarly, in U.S. Pat. No. 3,570,497 to Lemore, the strap has a needle end to penetrate tissue, where retention of the serrations are more simply accomplished by a latch collar, and was intended to be used as a fast means of applying a suture. However, none of these approaches are capable of providing support needed for the safe transportation of a sliding sash window or door.

[0010] Using this invention allows a sash window or door to be shipped with the sashes in the closed position, while remaining unlocked, thus eliminating stress that causes damage to the lock, keeper, and screws.

OBJECTS OF THE INVENTION

[0011] It is an object of the invention to provide a means of safely transporting a sliding sash window or door.

[0012] It is another object of the invention to provide a means of safely transporting a sliding sash window or door without the use of bulky packaging materials.

[0013] It is a further object of the invention to provide a single means of securing a sliding sash window or door that may universally be utilized by different sized windows and doors.

[0014] It is another object of the invention to provide a means of securing a sliding sash window or door in the closed position without the use of the window’s lock and keeper.

[0015] It is also an object of the invention to provide a means of securing a sliding sash window or door in the closed position by utilizing the sash window frame.

SUMMARY OF THE INVENTION

[0016] The clip assembly of the present invention may be used to secure one or more objects, particularly the sliding sashes of a window or door during transportation, to prevent damage to the sashes or to prevent damage to the lock and keepers when shipped in the locked condition, as well as to obviate the need of using cumbersome cardboard blocking as a restraint.

[0017] The clip assembly may be comprised of two separate molded parts—a strap member and a pawl member. The strap member may be formed to have a bumper portion, and a strap portion extending from the bumper. The bumper may preferably have an engagement wall, and a bottom wall that is supported to be approximately orthogonal to the engagement wall by first and second side walls. The strap portion may have a plurality of teeth formed within the thickness of the strap. The strap teeth may be formed to have an engagement...
face and a back face, which converge to create a peak, and whereby successive teeth are separated by a trough. Also, the strap portion may terminate in a thinner strap section, with a ramp between the two strap sections, and where the thinner strap section may have a rounded end which may also be ramped to facilitate its insertion into the pawl.

[0018] The pawl member may have a pair of sidewalls supported by a top wall and an intermediate wall. The top wall may have a protrusion which includes a plurality of teeth formed to complement the teeth of the strap, and be located proximate to the intermediate wall. The teeth may be located at a distance from the intermediate wall to permit the strap to be trapped there between, once it is inserted. Insertion of the strap may be accomplished whereby the strap causes deflection of the pawl teeth and the protrusion. This required deflection of the pawl teeth and protrusion may be aided by a recess in the intermediate wall to take advantage of the flexible nature of the strap.

[0019] To restrain a window for transit by truck or rail, a strap of the current invention may be inserted through the gap between the top rail of an upper sash and the bottom rail of the second sash, and then be inserted into the pawl, such that engagement edges of the first and second side walls of the pawl abuts the top rail of the bottom sash. Insertion of the strap into the pawl may occur by inserting the free end of the strap portion into the gap between the strap teeth and the intermediate wall, to engage the pawl teeth until the engagement edge of the first and second side walls of said pawl firmly contacts the bottom rail of said second sash.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. 1 is a perspective view of the strap and the pawl of the current invention aligned and ready for engagement.
[0021] FIG. 2 is a perspective view showing the serrated strap engaged with the pawl of the current invention.
[0022] FIG. 3 is a side view showing the serrated strap engaged with the pawl of the current invention.
[0023] FIG. 4 is a wireframe perspective view of the pawl of the current invention.
[0024] FIG. 5 is a front view of the pawl of the current invention.
[0025] FIG. 6 is a top view of the pawl of the current invention.
[0026] FIG. 7 is a side view of the pawl of the current invention.
[0027] FIG. 8 is a section cut through the mid-plane of the pawl of the current invention.
[0028] FIG. 9 is an enlarged view of the pawl teeth of the current invention.
[0029] FIG. 10 is a top view of the strap of the current invention.
[0030] FIG. 11 is an end view of the strap of the current invention.
[0031] FIG. 12 is a side view of the strap of the current invention.
[0032] FIG. 13 is a bottom view of the strap of the current invention.
[0033] FIG. 14A is a side view showing a first installation embodiment of serrated strap engaged with the pawl of the current invention, as installed between the sashes of a sliding sash window, with the engagement wall of the bumper engaging the upper sash.
[0034] FIG. 14B is a side view showing a variation of the first installation embodiment of serrated strap engaged with the pawl of the current invention, as installed between the sashes of a sliding sash window, with the engagement wall of the bumper engaging the upper sash.
[0035] FIG. 15A is a side view of a sliding sash window in a master frame, with one sash opened.
[0036] FIG. 15B is a side view showing the first step in a second installation embodiment of the serrated strap being engaged between the sashes of a sliding sash window.
[0037] FIG. 15C is a side view showing a second installation embodiment of the serrated strap engaged with the pawl of the current invention, as installed between the sashes of a sliding sash window.
[0038] FIG. 16A is a side view showing the first step in an installation embodiment with the serrated strap being fed between the sashes of a tiltable sash window.
[0039] FIG. 16B is a side view showing an installation embodiment of the serrated strap engaged with the pawl of the current invention, as installed between the sashes of a tiltable sash window.
[0040] FIG. 17 is a side view showing the second installation embodiment with the serrated strap engaging the upper sash and engaged with the pawl of the current invention, as the pawl first contacts the lower sash of a sash window.
[0041] FIG. 18 is a side view showing the second installation embodiment with the serrated strap engaging the upper sash and engaged with the pawl of the current invention, as the pawl is snapped into place to secure the lower sash relative to the upper sash a window.
[0042] FIG. 19 is an enlarged side view showing the second installation embodiment with the serrated strap engaging the upper sash and engaged with the pawl of the current invention, as the pawl is snapped into place to secure the lower sash relative to the upper sash a window.
[0043] FIG. 20 is an enlarged side view showing disengagement of the serrated strap from the pawl of the current invention, through failure of the pawl teeth and the pawl top wall.
[0044] FIG. 21 is a top view of an alternate strap configuration with cylindrical protrusions.
[0045] FIG. 22 is a side view of the alternate strap configuration of FIG. 21.
[0046] FIG. 23 is a side view of an alternate pawl configuration with a protrusion orifice.
[0047] FIG. 24 is a side view showing installation of the alternate strap securing the upper sash and engaged with the alternate pawl configuration, which secures the lower sash.
[0048] FIG. 25 is a side view showing installation of the threaded strap configuration securing the upper sash and engaged with the threaded pawl configuration, which secures the lower sash.
[0049] FIG. 26 is a side view showing an alternate embodiment for the pawl, as engaged with the serrated strap of the current invention.
[0050] FIG. 27 is a section view through the alternate embodiment of the pawl of FIG. 26, as engaged with the serrated strap of the current invention.
[0051] FIG. 27A is an enlarged view showing engagement of the pawl teeth with the strap of the alternate embodiment of FIG. 27.
[0052] FIG. 28 is a perspective view showing alternate installations with a sash window for the alternate embodiment of the pawl of FIG. 26, as engaged with the serrated strap of the current invention.

DETAILED DESCRIPTION OF THE INVENTION

[0053] FIG. 2 shows a first embodiment of the present invention, a transportation clip assembly 10, which includes a
pawl member 20 and a strap member 60. FIG. 1 illustrates the strap member 60 as it is being inserted into the pawl member 20 to have engagement with, and mono-directional travel relative to, the pawl member. FIG. 3 shows a side view of the clip assembly 10.

[0054] The pawl member 20 and strap member 60 may be made from any suitable materials, including, but not limited to, plastic. The pawl member 20 may be formed of various different shapes, but in a preferred embodiment, as shown in FIGS. 4-7, the pawl member 20 may have a first side wall 21 and a second side wall 22, which may be maintained at a set distance by top wall 24 and intermediate wall 25. First side wall 21 and second side wall 22 may be generally parallel to each other, but need not be so oriented.

[0055] The thickness of each of the walls may be adjusted to increase the overall strength of the clip assembly 10. The strength should accommodate most, if not all, sash windows, but could be increased with the aforementioned thickness changes to accommodate larger sliding doors. To encourage commonality, a single sized clip may be utilized for securing various fenestration products, and when it is necessary to secure larger, heavier sliding doors, multiple transportation clip assemblies 10 may be utilized rather than a single stronger clip.

[0056] The outer edges of the first side wall 21 and a second side wall 22 may have an outside corner radius 53 around the periphery of the walls to eliminate any sharp edges which might tend to scrape or otherwise damage the finish of the windows.

[0057] The periphery of the first and second side walls 21 and 22 may be formed with various different contours. As shown in one embodiment, side walls 21 and 22 may be formed with an engagement edge 38 that may transition into a rounded engagement corner 39 on one end, and into a lateral support edge 40 on the other end. These engagement features of the side walls 21 and 22 of pawl member 20 may bear up against the sashes of the window when engaged by the strap member 60, as seen in FIG. 14.

[0058] The remaining outer edges of first and second side walls 21 and 22 may comprise various different configurations, and in one embodiment may have edges 41 and 42, whereby edges 40 and 41 may have a straight edge transition 43 between them, or a rounded corner (not shown), and edges 41 and 42 may have a straight edge transition 44 between them. Edge 42 may connect tangentially to the rounded engagement corner 39 (not shown), or alternatively, there may be edges 45 and 46, between which may be a radius 47, and there may also be an edge 48 that may be approximately parallel to edge 45. Edge 46 may transition into edge 48 using an outside corner 49. Edge 48 may transition into rounded engagement corner 39 by way of edges 50 and 51. The edges 42, 45, and 46 may serve as support for a tool that may be used to apply tension to the strap member 60 relative to the pawl member 20, and tightly secure both sashes 11 and 13 of the window relative to each other, and relative to the master frame 15 (FIG. 15A), as will be discussed hereinafter. In an alternate embodiment, discussed hereinafter, rounded engagement corner 39, and edges 50 and 51 may be seated between window sashes to secure the sashes.

[0059] The section view, in FIG. 8, through pawl member 20 reveals the top wall 24 and intermediate wall 25 as formed in a preferred embodiment. Intermediate wall 25 may be formed to have an axial portion, which as pictured in FIG. 8, appears as a horizontal wall portion 26 having a top surface 27 and a bottom surface 28. The horizontal wall portion 26 may transition, by way of a curved region 31, into a vertical portion 32. As may be seen hereinafter, the curved portion 31 may assist in guiding the strap member 60 to engage with the pawl member 20. The vertical portion 32 may serve to support the side walls 21 and 22, to deflect the strap member 60 when trying to engage it with the pawl member 20, or as structural support in an alternate embodiment (FIGS. 17-19).

[0060] The top wall 24 may span the entirety of edges 40, 41, and 43 of the first and second side walls 21 and 22, or may, as shown in FIG. 8, only span a portion thereof. Protruding away from the top wall 24 and towards the top surface 27 of the horizontal portion 26 of intermediate wall 25 may be a triangular-shaped protrusion 23, which forms a gap 50 with top wall 24, making the protrusion 23 generally flexible with respect to top wall 24. Triangular-shaped protrusion 23 may have a plurality of teeth 33. Although only three teeth are shown in FIG. 8 for pawl member 20, the number of teeth may be increased to provide greater strength in the connection between the strap member 60 and pawl member 20, which may be required for corresponding increases in wall thicknesses, as previously described.

[0061] As seen in the enlarged view of the plurality of teeth 33 in FIG. 9, each tooth may be formed to have a back face 35, which meets a front face or engagement surface 36 at the apex 37. Where the back face of one tooth meets the front face of an adjacent tooth may be a tough 34. The back face 35 and front face 36 are shown in to be flat in FIG. 9, with the front face being approximately perpendicular to the intermediate wall 25, however, other possible shapes and orientations may be utilized. The configuration shown may be preferable to assist in the mating of the strap member 20 with the pawl member 60. The distance between the apex 37 of the plurality of teeth 33 and the top surface 27 of the horizontal portion 26 of intermediate wall 25 may be crucial to the interconnection between the strap member 60 and pawl member 20, which is discussed further hereinafter.

[0062] The strap member 60 may be formed to have a bumper portion 80 connected to a strap portion 61. Bumper portion 80 may be formed of a number of different ways. In one embodiment, bumper portion 80 may be comprised of only an engagement wall 81. However, to help counter unintended rotation of the engagement wall 81 upon installation of the strap member 60 between first and second sashes 11 and 13 of a window, engagement wall 81 may preferably be connected to a bottom wall 84. Bottom wall 84 may preferably be approximately orthogonal to engagement wall 81. This orthogonal relationship between bottom wall 84 and engagement wall 81 may be supported by first and second side walls 82 and 83, which may be parallel to each other.

[0063] All of the exterior edges of the bottom wall 84, engagement wall 81, and first and second side walls 82 and 83 may be rounded through use of outside corner radius 85. Having the corners thus relieved may serve to prevent scrapes and other facial damages to the windows upon which the transportation clip assembly 10 may be installed. In addition, the engagement wall 81 may have a cushioning material (not shown) attached thereto to further protect the window. The cushioning material may include, but is not limited to, rubber that is attached to the engagement wall 81 through any acceptable means for the particular cushioning material chosen, including, but not limited to, glue or epoxy. The same cush-
ioning material may also be utilized upon the engagement edges 38 of the first and second side walls 21 and 22 of the pawl member 20.

[0064] The strap portion 60 of strap member 60 may be comprised of a plain strap 62, which may be connected to the engagement wall 81 of the bumper portion 80 using fillet radii 63, which may thereby improve the durability of the connection. Plain strap 62, may, but need not, have a rectangular cross-section, having a thickness 71. The plain strap 62 may transition into a serrated strap 64, which may have the same cross-section as plain strap 62, but which further comprises a plurality of strap teeth 66, which may be similarly constructed as the plurality of pawl teeth 33, but formed so as to be complementary in nature to the pawl teeth 33 so as to mesh with and thereby be retained by the pawl teeth 33 of pawl member 20 when the strap member 60 is therein inserted.

[0065] The plurality of strap teeth 66 may be formed within the thickness 71 of the cross-section of the serrated strap 64, leaving a narrow portion of plain strap 64 on each side of the strap teeth 66, which may not extend to the full width of the serrated strap 64.

[0066] Proper functional engagement of the plurality of strap teeth 66 with the plurality of pawl teeth 33 is obtained through careful control of several features and dimensions. As previously stated, the distance between the apexes 37 of the plurality of teeth 33 of pawl 20 from the top surface 27 of the horizontal portion 26 of intermediate wall 25 may be crucial to this functional engagement. Proper engagement may generally depend upon trapping the serrated strap 64 against the top surface 27 of the horizontal portion 26 of intermediate wall 25. Snugly trapping the serrated strap 64 may preferably require a combination of deflection of the protrusion 23 and deflection of the serrated strap 64 when feeding the strap member 60 into pawl member 20.

[0067] Deflection of the protrusion 23 may occur when the strap teeth 66 contact the pawl teeth 33 resulting in a load to the protrusion and causing angular deflection at the gap 50 (FIG. 9) towards the top wall 24. This invention furthermore takes advantage of the flexural nature of the strap portion 61 when being inserted into the pawl member 20, through its tendency to bend or even buckle under compression loading, by incorporating a recess 29 in the top surface 27 of the horizontal portion 26 of the intermediate wall 25. The recess 29 may necessitate the use of a step 52 in the lower surface 28 of the horizontal portion 26 of intermediate wall 25 to increase thickness, in order to accommodate the thickness reduction due to the recess 29.

[0068] The recess 29 allows the serrated strap 64 region of strap 60 to deflect downward, under the compression loading, away from the plurality of teeth 33 of the triangular protrusion 23, as the triangular protrusion 23 and teeth 33 simultaneously deflect upward. The recess 29 may have curved transitions 51 with the top surface 27 of the intermediate wall 25 to facilitate bending of the strap 60 in proximity to the plurality of teeth 33 of the pawl 20. The recess 29 may preferably have a maximum depth such that the distance between the apex of the teeth 33 of the pawl 20 and the recess 29 is approximately equal to said thickness 71 of the strap.

[0069] It may be seen that loading of the strap 60 in tension relative to the pawl 20, by sash windows 11 and 13 (FIG. 14), may cause the protrusion 23 with the plurality of teeth 33 to deflect downward and trap the strap 60 against the top surface 27 of the horizontal portion 26 of intermediate wall 25. The downward deflection of protrusion 23 with the plurality of teeth 33 would not permit the recess 29 to facilitate disengagement of the serrated strap 64 from the pawl 20, the way the recess 29 facilitates engagement.

[0070] Initial engagement of the strap 60 with the pawl 20 may be furthered by having a plain strap section 67 which may be thinner than plain strap 62, and may transition to the serrated strap 64 using a ramp 68. The thin plain strap 67 may terminate in a tapered and ramped end 69. The tapered ramped end 69 may have an orifice 70 which may be used in conjunction with a tool (not shown) to apply tension to the strap 60 relative to the pawl 20, to pre-load the window sashes 11 and 13 relative to each other, and in a direction opposite to each other, when in the closed position. In general, the upper sash 11 will be loaded towards the upper portion of the master frame 15, with a corresponding loading of the lower sash 13 towards the lower portion of the master frame. The tool may have a prong that retains the orifice 70 and allows the strap portion 61 to be rolled up on the tool, and whereby the roll may act against the edges 45 and 46 of first and second side walls 21 and 22 of pawl 20. The ability to apply such tension between the pawl member 20 and the strap member 60 permits further engagement of one or more of the pawl teeth 33 with said strap teeth 66 to generate the pre-loaded sash arrangement. The pre-loaded window sashes 11 and 13 will be biased away from each other, and be biased to engage the master window frame (not shown), without having to use the locking hardware of the window.

[0071] FIG. 14 illustrates the strap member 60 after having been engaged with the pawl member 20 to restrict relative movement of the upper sash 11 and lower sash 12 of a sliding sash window. As seen in FIG. 14, the strap portion 61 of the strap 60 may be inserted through a space between a top rail 14 of a first sash 13 and a bottom rail 12 of a second sash 11. The engagement wall 81 of the pawl 20 may abut the top rail 14 of said bottom sash 13. The free end 69 of the strap portion 61 may be inserted into the gap in the pawl member 20 between the strap teeth 33 and intermediate wall 25, such that the strap teeth 33 of the serrated strap 64 engage the pawl teeth 66.

[0072] The strap portion 61 may thus be continuously inserted until the engagement edge 38 of the first and second side walls 21 and 22 of the pawl member 20 contacts the bottom rail 12 of the sash 11. The rounded engagement corner 39 may also contact the bottom rail 12, as the installation of transportation clip assembly 10 may tend to cause slight rotation of the pawl member 20. In addition, the lateral support edge 40 and transition edge 43 may contact the lower sash 13, with such rotation. The existence of, or the amount of, rotation may depend upon the extent of pre-loading that is established.

[0073] An alternate installation embodiment is shown in FIGS. 15A through 15C for a sliding sash window, and in FIGS. 16A and 16B for a tiltable/slidable sash window. For both window types, the bumper portion 80 of the strap member 60 may be fed between the two sashes, while the sash is slid open or tilted open. The engagement wall 87 of the bumper portion 80 of the strap member 60 may then rest up against the bottom rail 12 of the upper sash 11. The pawl member 20 may then be inserted upon the strap member 60, as seen in FIG. 17, until the rounded engagement corner 39 contacts the top rail 14 of lower sash 13. The pawl member 20 may then be rotated so that engagement wall 87 of pawl member 20 butts against, the side of the bottom rail 12 of upper sash 11, while edge 48 of pawl member 20 butts against the top of bottom rail 14 of lower sash 13. Thereafter, rounded
engagement corner 39 and edge 51 may be snapped into the gap between the sashes 11 and 13.

[0074] Removal of transportation clip assembly 10 is illustrated in FIG. 20. Removal is accomplished by applying a force to the thin plain strap 67 of strap member 60, such that it is at an angle 90 relative to portion 26 of intermediate wall 25 of pawl 20. Application of such a force causes failure of the pawl teeth 33 and of top wall 24, with release of the strap member 60 from pawl member 20.

[0075] An alternate embodiment of the current invention is shown in FIGS. 22 through 24. FIGS. 21 and 22 illustrate an alternate embodiment in which strap member 100 has, instead of strap teeth, a plurality of cylindrical protrusions 101, each of which has a slanted face 112 oriented so as to face away from the bumper portion. The slanted face 112 may engage the protrusion 101 of pawl member 100 to permit deflection of the protrusion 101, as well as flexing of the strap 110, with incremental engagement of cylindrical protrusions 111 of strap 100 with orifice 102 of the protrusion 101.

[0076] In another alternate embodiment, shown in FIG. 25, the strap 107 transitions from a thin flat strap portion into an externally threaded cylindrical portion 108 that is received by internal threading on the pawl 105. The pawl 105 may have a swivel end 106 to permit rotational engagement of the threaded portion 108 of the strap 107 without rotation of the pawl 105 at the rail 14 of window 13.

[0077] In FIGS. 26 and 27, an alternate embodiment is shown with a pawl 120, which may be utilized for two different installation configurations. The pawl 120 may have resemble pawl 20. The rotation required of the horizontal installation may serve to provide a greater tension force between the window sashes 11 and 13, which may be needed for transportation of larger and heavier doors and windows.

[0080] Pawl 120 may also comprise, as seen in FIG. 27A, a wall 128 with protruding portion 129 having a plurality of teeth 130, as well as a wall 131, which are comparable to the top wall 24, protruding portion 23 and intermediate wall 25 of pawl 20. However, in pawl 120, wall 131 also may have a plurality of teeth 132. Also, the strap member 160 may have a serrated strap portion with a plurality of teeth 161 on one side of the strap 160 to engage the teeth 130 on protruding portion 129, as well as a plurality of teeth 162 on the opposite side to engage the teeth 132 of wall 131. Therefore, the engagement of strap 160 with pawl 120 may occur with engagement of teeth on both sides of the strap 160 to provide a sturdier connection therebetween, which may be beneficial for the horizontal installation where greater loads may be involved. The teeth 161 need not be aligned with teeth 162, and may instead be staggered as seen in FIG. 27A.

[0081] The pawl 120 also has walls 128 and 131 oriented at an angle from wall 121, with a narrow, necked down region 133 located at the intersection of those walls. The neck down region 133 may be utilized to cause failure of the engagement between strap 160 and pawl 120 by applying a force directly to the pawl 120, once the sash window or door is ready for installation in a building, and the installer seeks to remove the clip. Alternatively, failure may also be caused by applying a load only to the strap 160, as was previously discussed.

[0082] The examples and descriptions provided merely illustrate a preferred embodiment of the present invention. Those skilled in the art and having the benefit of the present disclosure will appreciate that further embodiments may be implemented with variations within the scope of the present invention. Other modifications, substitutions, omissions and changes may be made in the design, size, materials used or proportions, operating conditions, assembly sequence, or arrangement or positioning of elements and members of the preferred embodiment without departing from the spirit of this invention.

1. A clip assembly comprising:
   (a) a strap member, said strap member having a bumper portion and a strap portion; said bumper portion comprising at least an engagement wall; said strap portion further comprising a region having a first thickness, said strap portion extending from said engagement wall and terminating in a free end; at least a portion of said strap having a plurality of teeth being formed within said first thickness of said strap; each of said plurality of teeth having an apex and an engagement face;
   (b) a separate pawl member, said pawl member comprising first and second side walls, each of said first and second side walls having a periphery including at least an engagement edge; said first and second side walls being connected by a top wall and an intermediate wall; said top wall comprising a plurality of pawl teeth; each of said plurality of pawl teeth having an apex and an engagement face, said plurality of pawl teeth being generally shaped to mesh with said plurality of strap teeth, said apex of said strap teeth being located a distance away from said intermediate wall to create a gap being less than said first thickness of said strap; and
   (c) wherein said engagement wall of said strap member extends from one side of said strap portion and said engagement wall of said separate retaining member extends from an opposite side of said strap portion when
said separate retaining member engages said strap portion and wherein the distance between the separate retaining member and said bumper portion is adjustable along the length of said strap.

2. The clip assembly according to claim 1 wherein said intermediate wall has a curved recess, said curved recess being located proximate to said plurality of pawl teeth.

3. The clip assembly according to claim 2 wherein said recess of said intermediate wall has a maximum depth, said maximum depth being at a distance from said apex of said pawl teeth that is approximately equal to or less than said first thickness of said strap.

4. The clip assembly according to claim 3 wherein said engagement face of said pawl teeth is vertical.

5. The clip assembly according to claim 4 wherein said engagement face of said strap teeth is vertical.

6. The clip assembly according to claim 5 wherein said vertical engagement face of said pawl teeth contact said vertical face of said strap teeth and inhibit disengagement of said strap member from said pawl member.

7. The clip assembly according to claim 6 wherein said bumper portion of said strap member further comprises a bottom wall.

8. The clip assembly according to claim 7 wherein said engagement wall and said bottom wall of said strap member are connected by a first side wall and a second side wall.

9. The clip assembly according to claim 8 wherein said first and second side walls of said strap member are generally parallel.

10. The clip assembly according to claim 9 wherein said engagement wall and said bottom wall are approximately orthogonal to each other.

11. The clip assembly according to claim 10 wherein said first and second side walls of said pawl member are generally parallel.

12. The clip assembly according to claim 11 wherein said strap portion of said strap member is formed with a rectangular cross-section.

13. The clip assembly according to claim 12 wherein said strap portion of said strap member further comprises a second strap portion extending from said free end; said second strap portion having a thickness being less than said gap in said pawl member.

14. The clip assembly according to claim 13 wherein said thickness of said second strap portion transitions into said first thickness of said strap portion using a ramp.

15. The clip assembly according to claim 14 wherein said second strap portion terminates by tapering into a rounded end.

16. The clip assembly according to claim 15 wherein said tapered end of said second strap portion further comprises ramping down in thickness from said thickness of said second strap portion to a thickness being less than one-quarter of said thickness of said second strap portion.

17. The clip assembly according to claim 16 wherein said engagement wall of said bumper portion of said strap member transitions into said bottom wall and said first and a second side walls using an outside corner radius.

18. The clip assembly according to claim 17 wherein said engagement wall of said bumper portion of said strap member further comprises a rubber cushion attached thereto.

19. The clip assembly according to claim 18 wherein said engagement edges of said first and second side walls of said pawl member further comprises a rubber cushion attached thereto.

20. The clip assembly according to claim 19 wherein said first thickness of said strap portion and said strap teeth formed therein are increased in size to accommodate heavier sashess.

21. The clip assembly according to claim 20 wherein said pawl teeth are increased in size to engage said size-increased strap teeth.

22. The clip assembly according to claim 21 wherein said tapered end of said second strap portion further comprises an orifice.

23. The clip assembly according to claim 22 wherein said orifice permits application of a force between said pawl member and said strap member to further engage one or more of said pawl teeth with said strap teeth.

24. The clip assembly according to claim 23 wherein said further engagement of one or more of said pawl teeth with said strap teeth pre-loads said first sash relative to said second sash.

25. The clip assembly according to claim 24 wherein said further engagement of one or more of said pawl teeth with said strap teeth pre-loads each of said first and said second sashess relative to said master frame of said window.

26. The clip assembly according to claim 25 wherein said periphery including at least said engagement edge further comprises a plurality of edges, said plurality of edges forming at least one corner in said pawl member.

27. The clip assembly according to claim 26 wherein application of said force utilizing said orifice is accomplished using a tool, said tool being capable of tensioning said strap member relative to said pawl member using said plurality of edges.

28. The clip assembly according to claim 27 wherein said strap portion protrudes from said bumper portion with one or more fillet radii.

29. A clip assembly comprising:
   (a) a strap member, said strap member having a bumper portion and a strap portion; said bumper portion comprising at least an engagement wall; said strap portion further comprising a region having a thickness, said strap portion extending from said engagement wall and terminating in a free end;
   (b) a separate retaining member comprising a first end and a second end and having an orifice extending from said first end to said second end for receiving said strap portion, said retaining member being removably securable to said strap portion, said retaining member including at least an engagement wall on said first end; and
   (c) wherein said engagement wall of said strap member extends from one side of said strap portion and said engagement wall of said separate retaining member extends from an opposite side of said strap portion when said separate retaining member engages said strap portion, and wherein the distance between the separate retaining member and said bumper portion is adjustable along the length of said strap.

30. A clip assembly, for use in securing first and second sashess that are slidably retained within a master frame of a sash window or sash door during transportation, said transportation clip comprising: a first member and a second member; said first member comprising a strap and a bumper portion, said bumper portion extending outward from said strap
and having at least one engagement surface to engage a rail of said first sash, said strap being adapted to interconnect said first member to said second member, said interconnection providing for mono-directional movement of said first member relative to said second members wherein at least a portion of said strap may be incrementally inserted within said second member, with corresponding incremental removal of said strap being inhibited by said interconnection; said second member being adapted to receive said strap of said first member, said second member further comprising at least one engagement surface to engage a rail of said second sash; and wherein when said first member is interconnected with said second member while engaging said second sash rail, said at least one engagement surface of said second member extends outward from said second member in a direction opposite from which said at least one engagement surface of said first member engages said first sash rail.

31. The clip assembly according to claim 30, wherein said engagement of said second member with said second rail sash and said engagement of said first member with said first rail sash pre-loads said first and second sash relative to said master frame.

32. The clip assembly according to claim 31, wherein said pre-loading of said first sash relative to said master frame is in a direction opposite to said pre-loading of said second sash relative to said master frame.

33. The clip assembly according to claim 32, wherein said incremental insertion of said interconnection is accomplished by a plurality of teeth on at least a portion of said strap that engage one or more complementary teeth on said second member.

34. The clip assembly according to claim 32, wherein said incremental insertion of said interconnection is accomplished by a plurality of cylindrical protrusions on at least a portion of said strap that are retained by one or more orifices in said second member.

35. The clip assembly according to claim 34, wherein said incremental insertion of said interconnection is accomplished by a threaded post, wherein said strap of said first member transitions into said threaded post, said threaded post being retained by a threaded orifice in said second member.

36. A clip assembly, for use in securing first and second sashes that are slidably retained within a master frame of a sash window or sash door during transportation, said transportation clip assembly comprising: a strap member, said strap member being adapted to engage a rail of said first sash, with a portion of said strap protruding between said first and second sashes, said protruding portion of said strap having a plurality of teeth formed within at least a portion of said strap; and a pawl member, said pawl member being adapted to engage a rail of said second sash, said pawl member further comprising a first wall and a second wall, said first wall including a protrusion having one or more teeth, said one or more teeth of said pawl being formed to complement said plurality of strap teeth, said second wall being formed in proximity to said one or more pawl teeth to permit said strap to be fed there between and therein be retained by engagement between said one or more pawl teeth and said plurality of strap teeth; said protrusion being elastically deformable to permit deflection of said teeth and said protrusion upon mono-directional engagement of said strap with said pawl; said second wall having a recess proximate to said pawl teeth, said recess permitting flexing of said protruding portion of said strap to co-act with said elastic deformation of said pawl teeth and protrusion in permitting mono-directional engagement of said strap with said pawl.

37. The clip assembly according to claim 36, wherein said pawl member further comprises first and second side walls, said first and second side walls each comprise an engagement edge.

38. The clip assembly according to claim 37, wherein said engagement edge of said first and second side walls engages said rail of said second sash.

39. The clip assembly according to claim 36, wherein each of said first and second side walls of said pawl member further comprises a rounded engagement edge, said rounded engagement edge extending approximately orthogonally from said engagement edge.

40. The clip assembly according to claim 39, wherein said pawl is rotated to apply tension to said strap, said tensile loading causing said first sash to be loaded relative to said second sash, and wherein said rounded engagement edge is seated between said first and second sashes.

41. A method of securing first and second sashes that are slidably retained within a master frame of a sash window or sash door during transportation, said method comprising:

(a) providing a strap member, said strap member being adapted to engage a bottom rail of said first sash, with a portion of said strap protruding between said first and second sashes, said protruding portion of said strap having a plurality of teeth formed within at least a portion of said strap;

(b) providing a pawl member, said pawl member being adapted to engage a top rail of said second sash, said pawl member also having a first wall and a second wall, said first wall including a protrusion having one or more teeth, said one or more teeth of said pawl being formed to complement said plurality of strap teeth, said second wall being formed in proximity to said one or more pawl teeth to permit said strap to be fed there between and therein be retained by engagement between said one or more pawl teeth and said plurality of strap teeth; said protrusion being elastically deformable to permit deflection of said teeth and said protrusion upon mono-directional engagement of said strap with said pawl; said second wall having a recess proximate to said pawl teeth, said recess permitting flexing of said protruding portion of said strap to co-act with said elastic deformation of said pawl teeth and protrusion in permitting mono-directional engagement of said strap with said pawl;

(c) feeding said protruding strap of said strap member between said first and second sashes until said bottom rail of said first sash is engaged by said strap; inserting said protruding portion of said strap into said pawl member until said pawl member contacts said top rail of said second sash; additional feeding of said protruding strap into said pawl member to provide tension between said first and said second sashes and said master frame.

42. The method according to claim 41 wherein removal of said clip after transportation comprises applying a force to said strap member, said force being applied at an angle relative to said second wall to create stress on said one or more teeth of said protrusion of said pawl top wall, said stress causing at least some plastic deformation of said one or more teeth and causing said pawl teeth to disengage from said strap teeth.
43. A clip assembly for securing one or more objects, said clip assembly comprising: a first member and a second member; said first member comprising a strap and a bumper portion, said bumper portion extending outward from said strap and having at least one engagement surface, said strap being adapted to interconnect said first member to said second member, said interconnection providing for mono-directional movement of said first member relative to said second members wherein at least a portion of said strap may be incrementally inserted within said second member, with removal of said strap being inhibited by said interconnection; said second member being adapted to receive said strap of said first member, said second member further comprising at least one engagement surface; and wherein when said first member is interconnected with said second member, said at least one engagement surface of said second member extends outward from said second member in a direction opposite from which said at least one engagement surface of said first member.

44. The clip assembly according to claim 43, wherein said interconnection is by said strap of said first member comprising a first plurality of teeth on one side of said strap, and a second plurality of teeth on a second side of said strap; and wherein said second member comprises one or more teeth adapted to engage said first plurality of teeth of said first member, and one or more teeth adapted to engage said second plurality of teeth of said second member.

45. The clip assembly according to claim 44, wherein said first plurality of teeth on said one side of said strap and said second plurality of teeth on said second side of said strap are aligned.

46. The clip assembly according to claim 44, wherein said first plurality of teeth on said one side of said strap and said second plurality of teeth on said second side of said strap are staggered.

47. The clip assembly according to claim 44, wherein said engagement surface of said bumper portion of said first member contacts a rail of a first sash, and said engagement surface of said second member contacts a rail of a second sash, and wherein said mono-directional movement of said first member relative to said second members occurs until said clip assembly secures said first sash relative to said second sash within a master frame.

48. The clip assembly according to claim 47, wherein said first sash is secured relative to said second sash by loading said first sash in a direction opposite to said loading of said second sash.

49. The clip assembly according to claim 48, wherein said engagement surface of said second member comprises a protrusion, and wherein said protrusion is engaged in a gap between said first sash and said second sash when said first and second sashes are secured in said master frame by said clip assembly.

50. The clip assembly according to claim 49, wherein said second member is rotated to increase said loading of said first sash and said second sash relative to said master frame.

51. The clip assembly according to claim 50, wherein said engagement surface of said second member comprises a second protrusion, and wherein said second protrusion is engaged in said gap between said first sash and said second sash to inhibit counter-rotation of said second member.

52. The clip assembly according to claim 51, wherein said second member necks down at a position proximate to said interconnection.

53. The clip assembly according to claim 52, wherein said neck permits removal of said transportation clip from said sashes, said removal being by application of a force to said second member to cause failure of said second member at said neck.

54. The clip assembly according to claim 51, wherein removal of said transportation clip from said sashes is by application of a force to said strap to cause failure of said one or more teeth of said second member.

* * * * *