

Aluminium Storage Unit

Field of Invention

[0001] The present invention relates to an aluminium storage unit. For example, an aluminium cabinet, an aluminium shelf.

Background

[0002] Aluminium storage units have been commonly used in residential and commercial premises for storing things. Aluminium storage units are preferred over other materials as they are durable and strong. More importantly, aluminium storage units are corrosion resistant. However, the resources required to fabricate an aluminium storage unit can be considerably substantial. Consequently, the costs of aluminium storage units can be relatively high.

[0003] Depending on the design of the storage unit, the parts of the storage unit may require special machineries and may even require a skilled person to be fabricated. As it is difficult to fabricate the aluminium storage unit, it is thus difficult for a person to fabricate the storage unit using simple tools found at home, e.g. as a DIY project. Furthermore, due to the need for special machineries, the aluminium storage unit has to be fabricated offsite, e.g. in the factory. In the event that a minor alteration is required before installation of the aluminium storage unit onsite, the alteration cannot be done onsite and the storage unit has to be brought back to the factory to be altered before being brought back again to be installed. It can be appreciated that such an operation creates inconveniences and wastes time and resources.

[0004] Due to method of fabrication of the aluminium storage unit, the finished look of the storage unit may not be aesthetically pleasing. For example, screws and brackets may be used connect two adjacent aluminium panels together and the screws are typically seen externally therefore some people may find such storage units unsightly to be placed in their residences or workplaces.

[0005] Therefore, it is an objective of the present invention to overcome the abovementioned issues.

Summary

[0006] According to various embodiments, the present invention provides an aluminium storage unit having a joint including a connector having a first face and a second face, a first frame element having a pair of surfaces substantially parallel to each other, the first frame element includes an attaching side perpendicular to the pair of surfaces, such that each of the pair of surfaces has an area larger than the attaching side, and such that the attaching side of the first frame element is attached to the first face. Joint further includes a second frame element having a pair of surfaces substantially parallel to each other, the second frame element includes an attaching side perpendicular to the pair of surfaces, such that each of the pair of surfaces has an area larger than the attaching side, and such that the attaching side of the second frame element is attached to the second face.

[0007] According to various embodiments, the connector may include a first engaging member connected to the first face, the first engaging member adapted to engage the first frame element and a second engaging member connected to the second face, the second engaging member adapted to engage the second frame element.

[0008] According to various embodiments, the connector may include a tube having an external surface and an internal surface within the external surface, such that the first face and the second face are part of the external surface.

[0009] According to various embodiments, each of the first frame element and the second frame element may include an attaching member attachable to the first engaging member and the second engaging member respectively.

[0010] According to various embodiments, at least one of the first engaging member and the second engaging member may include a channel extending along the first face or the second face respectively, such that the attaching member may include a head adapted to be engaged by the channel.

[0011] According to various embodiments, the attaching member may be detachable from the first frame element or the second frame element.

[0012] According to various embodiments, the attaching member may be adapted to be operated between a locking configuration configured to lock the attaching member to the first engaging member or the second engaging member and an unlocking configuration configured to unlock the attaching member from the first engaging member or the second engaging member.

[0013] According to various embodiments, the connector may further include a first rear surface behind the first face and a second rear surface behind the second face, such that, the first rear surface and the second rear surface may be part of the internal surface.

[0014] According to various embodiments, the connector may include a base portion having the first face, the first rear surface, the second face and the second rear surface and a cover adapted to cover the first rear surface and the second rear surface.

[0015] According to various embodiments, the connector may further include a first through hole extending from the first rear surface to the first face and a second through hole extending from the second rear surface to the second face, such that the first engaging member may extend through the first through hole and the second engaging member may extend through the second through hole.

[0016] According to various embodiments, at least one of the first engaging member and second engaging member may include a fastener adapted to fasten at least one of the first frame element and the second frame element to the connector.

[0017] According to various embodiments, the first face may be perpendicular to the second face.

[0018] According to various embodiments, the first frame element or the second frame element may include a bar or a panel having a first end and a second end opposite the first end, such that the bar or panel may be connected to the connector at the first end.

[0019] According to various embodiments, the connector may include a first end and a second end opposite the first end, such that the connector may include an end cap adapted to cover each of the first end and the second end.

[0020] According to various embodiments, the first frame element may include a pair of bars, such that the aluminium storage unit may further include a pair of support arms extending from one of the pair of bars to the other, such that the pair of arms are slidable along the pair of bars.

Brief Description of Drawings

[0021] Fig. 1A shows a perspective view of an example of an aluminium storage unit with at least one joint.

[0022] Fig. 1B shows a close-up perspective view of an example of the joint.

[0023] Fig. 2 shows a front view of the joint of the aluminium storage unit in Fig. 1B.

[0024] Fig. 3 shows a sectional view of an example of the joint in Fig. 2.

[0025] Fig. 4 shows a blown-up view of the joint in Fig. 2.

[0026] Fig. 5 shows a sectional view of an example of the joint of the aluminium storage unit in Fig. 2.

[0027] Fig. 6 shows a blown-up view of the joint in Fig. 5.

[0028] Fig. 7A and Fig. 7B each shows a schematic view of an example of the attaching member in the locking and unlocking configuration respectively.

[0029] Fig. 8 shows a blown-up view of an example of the aluminium storage unit.

[0030] Fig. 8A shows an example of a support beam.

[0031] Fig. 9 shows a blown-up view of an example of the aluminium storage unit.

[0032] Fig. 10 shows an example of the aluminium storage unit.

[0033] Fig. 10A shows a sectional view of the aluminium storage unit in Fig. 10.

[0034] Fig. 11 shows a sectional view of an example of the joint in Fig. 2.

Detailed Description

[0035] Fig. 1A shows a perspective view of an example of an aluminium storage unit 10 with at least one joint 12. Storage unit 10 as shown in Fig. 1A may be a cabinet having a top panel 10T, a base panel 10B, a pair of side panels 10S extending from the top panel 10T to the base panel 10B. Storage unit 10 may include a pair of doors 10D and a back panel (not shown in Fig. 1A). Although the aluminium storage unit 10 as shown in Fig. 1 is a cabinet, the aluminium storage unit 10 may be an aluminium shelf, a storage unit made of aluminium, an aluminium framed storage unit, or a storage unit having a frame made from aluminium.

[0036] Fig. 1B shows a close-up perspective view of an example of the joint 12. Doors 10D of the storage unit 10 have been removed to show the joint 12. Joint 12 may be suitable for an aluminium storage unit 10. As shown in Fig. 1B, the joint 12 is formed between the top panel 10T and the side panel 10S.

[0037] Fig. 2 shows a front view of the joint 12 of the aluminium storage unit 10 in Fig. 1A. As shown in Fig. 2, the joint 12 has a connector 100 with a first face 100F and a second face 100S. Joint 12 has a first frame element 120 having a pair of surfaces 122A,122B substantially parallel to each other. First frame element 120 has an attaching side 120A perpendicular to the pair of surfaces 122A,122B, such that each of the pair of surfaces 122A,122B has an area larger than the attaching side 120A. Attaching side 120A of the first frame element 120 is attached to the first face 100F. Joint 12 has a second frame element 140 having a pair of surfaces 142A,142B substantially parallel to each other, the second frame element 140 has an attaching side 140A perpendicular to the pair of surfaces 142A,142B, such that each of the pair of surfaces 142A,142B has an area larger than the attaching side 140A. Attaching side 140A of the second frame element 140 is attached to the second face 100S.

[0038] Connector 100 may have quadrilateral, e.g. a square, sectional profile, such that the first face 100F may be perpendicular to the second face 100S. Connector 100 may have other sectional profile, e.g. hexagonal, octagonal. Accordingly, the first face 100F may also be at an acute or obtuse angle from the second face 100S depending on the shape of the connector 100 and the angle between the frame elements. Connector 100 may include a first rear surface 102F behind the first face 100F and a second rear surface 102S behind the second face 100S. First rear surface 102F, the first face 100F, the second face 100S and the second rear surface 102S may form the external surface 102E of the connector 100. Connector 100 may include a concaved curved surface 100C connected between the first face 100F and the second face 100S. Curved surface 100C may be adapted to connect the surface 122B of the first frame element 120 to the surface 142B of the second frame element 140. Curved surface 100C provides a gradual transition between the surface 122B of the first frame element 120 to the surface 142B of the second frame element 140 so as to provide a smooth internal corner in the storage unit 10. Curved surface 100C may be between any two frame elements. Compared to conventional storage units which have right angled internal corners, the curved surface 100C allows cleaning of the internal corners easier. In addition, the curved surface 100C may also prevent dust accumulation at the internal corners. When the first frame element 120 is connected to the connector 100, the surface 122A of the first frame element 120 may flush with the second rear surface 102S. Similarly, the surface 142A of the second frame element 140 may flush with the first rear surface 102F when the second frame element

140 is connected to the connector 100. In this way, the surfaces of the aluminium storage unit 10 may be clean looking without any steps along the surfaces. In addition, the flush surface allows easier cleaning of the storage unit 10. Curved surface 100C may be a planar surface connecting the first face 100F and the second face 100S and adapted to connect the surface 122B of the first frame element 120 to the surface 142B of the second frame element 140. For example, the planar surface may form an angle of 135 degrees with the first frame element 120 and with the second frame element 140.

[0039] First frame element 120 may have a first end 120F and a second end 120S (not shown in Fig. 2) opposite the first end 120F. Attaching side 120A may be disposed at the first end 120F. First frame element 120 may be connected to the connector 100 at the first end 120F such that the attaching side 120A contacts the first face 100F. Attaching side 120A of the first frame element 120 may be attached to the first face 100F. Second end 120S of the first frame element 120 may be connected to another connector (not shown in Fig. 2). Second frame element 140 may have an upper end 140U and a lower end 140L (not shown in Fig. 2) opposite the upper end 140U. Attaching side 140A may be disposed at the upper end 140U. Second frame element 140 may be connected to the connector 100 at the upper end 140U such that the attaching side 140A contacts the second face 100S. Attaching side 140A of the second frame element 140 may be attached to the second face 100S. Lower end 140L of the second frame element 140 may be connected to another connector (not shown in Fig. 2). A frame element, e.g. the first frame element 120, may be a bar, e.g. a beam or a column, of the storage unit 10. The frame element may also be a panel.

[0040] Fig. 3 shows a sectional view of an example of the joint 12 in Fig. 2. As shown in Fig. 3, the connector 100 may be a tube 102 having an external surface 102E and an internal surface 102I within the external surface 102E such that the first face 100F and the second face 100S are part of the external surface 102E. Tubular connector 100 may include a base portion 104B and a cover 104C adapted to cover the first rear surface 102F and the second rear surface 102S. Base portion 104B may include the first face 100F, the first rear surface 102F, the second face 100S and the second rear surface 102S. Connector 100 may include the first rear surface 102F behind the first face 100F and a second rear surface 102S behind the second face 100S. First rear surface 102F and the second rear surface 102S may be part of the internal surface 102I. First frame element 120 and the second frame element 140 may be

connected to the base portion 104B. Base portion 104B may include a first limb 104BA and a second limb 104BB extending perpendicularly from the first limb 104BA. First limb 104BA may have the first face 100F on one side and the first rear surface 102F on the other side of the first limb 104BA. Second limb 104BB may have the second face 100S on one side and the second rear surface 102S on the other side of the second limb 104BB. Connector 100 may include a first through hole 100H extending from the first rear surface 102F to the first face 100F and a second through hole 100I extending from the second rear surface 102S to the second face 100S.

[0041] Connector 100 may include a first engaging member 110 connected to the first face 100F, such that the first engaging member 110 may be adapted to engage the first frame element 120. Connector 100 may include a second engaging member 130 connected to the second face 100S, such that the second engaging member 130 may be adapted to engage the second frame element 140.

[0042] First engaging member 110 may be inserted through the first limb 104BA to engage the first frame element 120. First engaging member 110 may be inserted into the first through hole 100H of the connector 100. First engaging member 110 may be inserted from the first rear surface 102F, through the first through hole 100H and out from the first face 100F. First engaging member 110 may engage the first end 120F of the first frame element 120. First engaging member 110 may engage the attaching side 120A of the first frame element 120. First engaging member 110 may be removable from the connector 100. First engaging member 110 may extend into the first frame element 120 via its attaching side 120A. First engaging member 110 may be inserted into the first through hole 100H of the connector 100. First frame element 120 may include a retaining portion 124 adapted to retain the first engaging member 110 thereby securing the first frame element 120 to the connector 100.

[0043] Second engaging member 130 may be inserted through the second limb 104BB to engage the second frame element 140. Second engaging member 130 may be inserted into the second through hole 100I of the connector 100. Second engaging member 130 may be inserted from the second rear surface 102S, through the second through hole 100I and out from the second face 100S. Second engaging member 130 may engage the upper end 140U of the second frame element 140. Second engaging member 130 may engage the attaching side

140A of the second frame element 140. Second engaging member 130 may be removable from the connector 100. Second engaging member 130 may extend into the second frame element 140 via its attaching side 140A. Second engaging member 130 may be inserted into the second through hole 100I of the connector 100. Second frame element 140 may include a retaining portion 144 adapted to retain the second engaging member 130 thereby securing the second frame element 140 to the connector 100.

[0044] As the first engaging member 110 and the second engaging member 130 are being inserted through the first limb 104BA and the second limb 104BB respectively, both the first engaging member 110 and the second engaging member 130 may be exposed on the base 104B. Cover 104C may be attached to the base portion 104B to cover the exposed first engaging member 110 and the second engaging member 130. Cover 104C may have a first panel 104CA and a second panel 104CB extending perpendicularly from the first panel 104CA. First panel 104CA and the second panel 104CB may be attached to the first limb 104BA and the second limb 104BB of the base portion 104B respectively to form the tube 102. Cover 104C may be snap-fitted onto the base portion 104B. Cover 104C and base portion 104B may also be held together by magnetic means.

[0045] Referring to Fig. 3, at least one of the first engaging member 110 and second engaging member 130 may include a fastener 112,132 adapted to fasten at least one of the first frame element 120 and the second frame element 140 to the connector 100. Fastener 112 may extend from the first face 100F. Fastener 132 may extend from the second face 100S. Fastener 112,132 may be a screw and retaining portion 124,144 may be a hole adapted to engage the screw. Alternatively, the fastener 112,132 may be plug and retaining portion 124,144 may be a socket adapted to retain the plug. Fastener 112 may extend through the first through hole 100H of the connector 100 and into the first frame member 120. Fastener 132 may extend through the second through hole 100I of the connector 100 and into the second frame member 140. Fastener 112,132 may be screws insertable into the through hole 100H,100I and to the respective first frame element 120 and the second frame element 140.

[0046] Fig. 4 shows a blown-up view of the joint 12 in Fig. 2. As shown in Fig. 4, the connector 100 may be an elongated member. Base portion 104B and the cover 104C may be

elongated. Connector 100 may include a first end 100V and a second end (not shown in Fig. 4) opposite the first end 100V. As shown in Fig. 4, to assemble the joint 12, the first end 120F of the first frame element 120 may be disposed against the first face 100F of the base portion 104B of the connector 100. Retaining portion (not shown in Fig. 4) of the first frame element 120 may be aligned to the first through hole 100H of the connector 100. First engaging member 110 may be inserted through the first through hole 100H to engage the retaining portion so as to secure the first frame element 120 to the base portion 104B. Upper end 140U of the second frame element 140 may be disposed against the second face 100S (not shown in Fig. 4) of the base portion 104B of the connector 100. Retaining portion 144 of the second frame element 140 may be aligned to the second through hole 100I of the connector 100. Second engaging member 130 may be inserted through the second through hole 100I to engage the retaining portion 144 so as to secure the second frame element 140 to the base portion 104B. When the first frame element 120 and the second frame element 140 are connected to the base portion 104B, the cover 104C may be attached to the base portion 104B to conceal the first engaging member 110 and the second engaging member 130. Connector 100 may include an end cap 106 adapted to cover the first end 100V after the cover 104C is attached to the base portion 104B. Connector 100 may include another end cap (not shown in Fig. 4) adapted to cover the second end of the connector 100. First frame element 120 and the second frame element 140 may be a bar.

[0047] Fig. 5 shows a sectional view of an example of the joint 22 of the aluminium storage unit 10. Joint 22 may include the connector 200. Connector 200 may be a tube 202. Tube 202 may be a single piece construction such that it cannot be separated into two or more parts. Tube 202 may include a base portion and a cover. Connector 200 may include the first face 200F and the second face 200S. Connector 200 may have a first rear surface 202F and a second rear surface 202S. First face 200F, the second face 200S, the first rear surface 202F and a second rear surface 202S may form the external surface 202E of the connector 200.

[0048] Joint 22 may include the first frame element 220 having a pair of surfaces 222A, 222B substantially parallel to each other. First frame element 220 has an attaching side 220A perpendicular to the pair of surfaces 222A, 222B, such that each of the pair of surfaces 222A, 222B has an area larger than the attaching side 220A. Attaching side 220A of the first frame element 220 is attached to the first face 200F. Joint 22 has a second frame element 240

having a pair of surfaces 242A,242B substantially parallel to each other, the second frame element 240 has an attaching side 240A perpendicular to the pair of surfaces 242A,242B, such that each of the pair of surfaces 242A,242B has an area larger than the attaching side 240A. Attaching side 240A of the second frame element 240 is attached to the second face 200S.

[0049] Connector 200 may include a first engaging member 210 connected to the first face 200F, such that the first engaging member 210 is adapted to engage the first frame element 220. Connector 200 may include a second engaging member 230 connected to the second face 200S, such that the second engaging member 230 is adapted to engage the second frame element 240. Connector 200 may include the concaved curved surface 200C connected between the first face 200F and the second face 200S. Curved surface 200C may be adapted to connect the surface 222B of the first frame element 220 to the surface 242B of the second frame element 240.

[0050] First frame element 220 may be connected to the connector 200 at the first end 220F such that the attaching side 220A contacts the first face 200F. First engaging member 210 may engage the first end 220F of the first frame element 220. First engaging member 210 may engage the attaching side 220A of the first frame element 220. Second frame element 240 may be connected to the connector 200 at the upper end 240U such that the attaching side 240A contacts the second face 200S. Second engaging member 230 may engage the upper end 240U of the second frame element 240. Second engaging member 230 may engage the attaching side 240A of the second frame element 240.

[0051] Each of the first frame element 220 and the second frame element 240 may include an attaching member 260 attachable to the first engaging member 210 and the second engaging member 230 respectively. Attaching member 260 may include a head 262 adapted to engage the first engaging member 210 and the second engaging member 230. Head 262 may extend from the first end 220F of the first frame element 220. Similarly, the head 262 may extend from the upper end 240U of the second frame element 240. At least one of the first engaging member 210 and the second engaging member 230 may include a channel 270 extending along the first face 200F or the second face 200S respectively. Using the first frame element

220 being attached to the first face 200F as an example, the channel 270 may include a pair of brackets attached to the first face 200F. Head 262 may include a flange 262F adapted to be engaged between the brackets.

[0052] Fig. 6 shows a blown-up view of the joint 22 in Fig. 5. Attaching member 260 may be detachable from the first frame element 220 or the second frame element 240. For illustration purpose, the second frame element 240 will be used as an example. The same description is applicable to the first frame element 220 or any other frame element of the storage unit 10. Second frame element 240 may include a slot 246 adapted to receive and retain the attaching member 260 in the second frame element 240. Attaching member 260 may be inserted into and retained within the slot 246 of the second frame element 240. When the attaching member 260 is inserted into the second frame element 240, the head 262 extends from the attaching side 240A of the second frame element 240. First frame element 220 may include an opening (not shown in Fig. 6) and the second frame 240 may include an opening 240N. Opening 240N may be adapted to allow access through the frame elements to the attaching member 260 when the attaching member 260 is inserted into the respective frame elements so that the attaching member 260 may be actuated to lock the respective frame elements to the connector 200 as explained below. First frame element 220 may include a plug (not shown in Fig. 6) and the second frame element 240 may include a plug 240P adapted to cover the opening 240N.

[0053] Fig. 7A and Fig. 7B each shows a schematic view of an example of the attaching member 260 in the locking and unlocking configuration respectively. Attaching member 260 may be adapted to be operated between a locking configuration configured to lock the attaching member 260 to the first engaging member 210 (not shown in Fig. 7A or Fig. 7B) or the second engaging member 230 and an unlocking configuration configured to unlock the attaching member 260 from the first engaging member 210 or the second engaging member 230. Fig. 7A and Fig. 7B show the attaching member 260 disposed within the second engaging member 230 of the second frame element 240. As shown in Fig. 7A, when the attaching member 260 is operated into the locking configuration, the head 262 may extend from the second frame element 240 where the flange 262F is spaced from the attaching side 240A of the second frame element 240. Second engaging member 230 may be clamped

between the flange 262F and the attaching side 240A of the second frame element 240 thereby locking the second frame element 240 to the connector 200 (not shown in Fig. 7A). Referring to Fig. 7B, when the attaching member 260 is operated into the unlocking configuration, the head 262 may further extend from the attaching side 240A of the second frame element 240 such that the flange 262F may be spaced further away from the attaching side 240 of the second frame element 240 then when the attaching member 260 is in the locking configuration. In this way, the second engaging member 230 is unlocked or released from the flange 262F and the attaching side 240A. In order to attach the second frame element 240 to the connector 200, the attaching member 260 may be operated into the unlocking configuration as shown in Fig. 7B. Head 262 may be slotted into the second engaging member 230, which in this example is the bracket. Thereafter, the attaching member 260 may be operated into the locking configuration thereby retracting the head 262 towards the attaching side 240A of the second frame element 240 and until the flange 262F clamps the second engaging member 230 onto the attaching side 240A as shown in Fig. 7A,

[0054] Referring to Fig. 7B, the attaching member 260 may include a casing 264 adapted to reside within the second frame element 240, a locking member 266 slidable along a longitudinal axis 260A within the casing 264, such that the locking member 266 may be slidable between an extended position as shown in Fig. 7B and a retracted position as shown in Fig. 7A. Locking member 266 may include the head 262 protruding from the casing 264, such that the head 262 may be movable between a locking position to lock the connector 200 (not shown in Fig. 7A) to the second frame element 240 when the locking member 266 is in the retracted position (as shown in Fig. 7A) and a releasing position adapted to release the connector 200 from the second frame element 240 when the locking member 266 is in the extended position. Attaching member 260 may further include an actuator 268 adapted to actuate the locking member 266 towards the retracted position.

[0055] Referring to Fig. 7B, the casing 264 may include an open end 264E and a closed end 264C opposite the open end 264E. Casing 264 may include a cylindrical tubular body 264Y extending from the closed end 264C to the open end 264E. Casing 264 may also have a quadrilateral sectional profile instead of a circular profile or any profile as long as it is able to receive the locking member 266. Casing 264 may include an opening 264A for the actuator

268 to be displaced therethrough, such that the opening 264A may be adapted to prevent the actuator 268 from moving along the longitudinal axis 260A. Opening 264A may be disposed between the open end 264E and the closed end 264C. Opening 264A may be circular, square or any profile that is suitable to receive the actuator therethrough. Actuator 268 may be inserted into the casing 264 through the opening 264A. When the actuator 268 is inserted into the opening 264A, the actuator 268 may be prevented by the opening 264A from moving in a direction parallel to the longitudinal axis 260A.

[0056] As shown in Fig. 7B, the locking member 266 may include a first end 266F having the head 262, and a second end 266S opposite the first end 266F. Locking member 266 may include an elongated body 266B extending from the first end 266F to the second end 266S. Body 266B may have a circular sectional profile that corresponds with the circular internal sectional profile of the casing 264 so that the locking member 266 may slidably fit into the casing 264. Locking member 266 may include a ramp 266R disposed between the first end 266F and the second end 266S and facing the first end 266F. Ramp 266R may be disposed on the body 266B. When the actuator 268 is actuated against the ramp 266R, the ramp 266R and therefore the locking member 266 may be displaced toward the retracted position as shown in Fig. 7A. Locking member 266 may include an arcuated recess 266A, such that the ramp 266R may be part of the recess 266A. When the actuator 268 is actuated toward the locking member 266, the actuator 268 may be displaced toward the lowest point of the recess 266A. In this position, the locking member 266 would be in the retracted position as shown in Fig. 7A.

[0057] Head 262 may be disposed at the first end 266F of the locking member 266. When the locking member 266 is disposed in the casing 264 as shown in Fig. 7B, the head 262 may extend out from the open end 264E of the casing 264. Head 262 may include the flange 262F adapted to engage the connector 200 (not shown in Fig. 2A). Flange 262F may be spaced from the casing 264. Flange 262F may be as wide as or narrower than the width of the casing 264. As shown in Fig. 7A, when the actuator 268 is at the bottom of the recess 266A, the flange 262F may be nearer to the open end 264E of the casing 264. When the actuator 268 is at the top of the ramp 266R, the flange 262F may be spaced further from the open end 264E of the casing 264. Accordingly, when the locking member 266 is positioned anywhere

between the extended position and the retracted position, the actuator 268 may be disposed corresponding between the top of the ramp 266R and the bottom of the recess 266A.

[0058] Locking member 266 may be substantially shorter than the casing 264 such that the casing 264 has a void 260V between the closed end 264C of the casing 264 and the second end 266S of the locking member 266. Void 260V may allow the locking member 266 to move towards the closed end 264C of the casing 264 so that the flange 262F is able to move toward the open end 264E of the casing 264 and clamp onto the connector (not shown in Fig. 7B) more fittingly when the actuator 268 actuates the locking member 266 toward the closed end 264C of the casing 264. Attaching member 260 may include a collar 269 adapted to be retained within the opening 264A. Collar 269 may include a through hole 269T in a direction parallel to the longitudinal axis 260A, such that the locking member 266 may be adapted to slide through the through hole 269T. Collar 269 may include a hole 269H adapted to receive the actuator 268 therein. Hole 269H may extend perpendicularly to the longitudinal axis 260A and be connected to the through hole 269T. Hole 269H may be threaded and the actuator 268 may be a threaded nut adapted to engage the hole 269H.

[0059] Actuator 268 may be displaced toward the locking member 266 by rotating the actuator 268 within the hole 269H. Actuator 268 may be actuated in a direction perpendicular to the longitudinal axis 260A. In the example as shown in Fig. 7B, the actuator 268 may be rotated in one direction, e.g. clockwise, to displace the actuator 268 toward the locking member 266. When the actuator 268 is being rotated in the opposite direction, e.g. counter-clockwise, the actuator 268 may be displaced away from the locking member 266. Although the actuator 268 may engage the collar 269 whereby the opening 264A may be threaded. Actuator 268 may engage the casing 264 directly where the actuator 268 may be restrained from moving in the direction parallel to the longitudinal axis 260A directly by the opening 264A of the casing 264. Actuator 268 may include an engaging portion 268E adapted to engage a tool to actuate it. Engaging portion 268E may be a slot for screwdriver, a keyhole etc. Actuator 268 may be adapted to be locked at any position along the hole 269H of the collar 269. Due to the screw thread engagement between the actuator 268 and the hole 269H, the actuator 268 may be able to be locked at any position along the hole 269H. In this way, the locking member 266 may be locked in the respective position along the casing 264 and keep the second frame element 240 locked to the connector 200.

[0060] Referring to Fig. 7B, the casing 264 may further include another opening 264B in line with the opening 264A. A through hole may be formed between the opening 264A and the another opening 264B. Collar 269 may be adapted to be retained within the another opening 264B. When the collar 269 is inserted into the casing 264, the collar 269 may be inserted either through the opening 264A or the another opening 264B. Collar 269 may be adapted to be restrained by the opening 264A and the another opening 264B from moving along the direction parallel to the longitudinal axis 260A. In this way, the opening 264A and the another opening 264B can better retain the collar 269 when the locking member 266 being pushed along the longitudinal axis 260A.

[0061] Attaching member 260 may include a biasing element 265 adapted to bias the locking member 266 towards the extended position as shown in Fig. 7B. Biasing element 265 may be disposed between the casing 264 and the locking member 266. As shown in Fig. 7B, the biasing element 265 may be disposed within the void 260V in the casing 264. Biasing element 265 may be a spring or any resilient element that is adapted to push the locking member 266 away from closed end 264C of the casing 264. Consequently, the biasing element 265 may be adapted to increase the spacing between the flange 262F and open end 264E of the casing 264 when the actuator 268 is actuated away from the locking member 266.

[0062] Referring to Fig. 7A, when the actuator 268 is actuated towards the centre of the recess 266A, e.g. by turning actuator 268 clockwise, it pushes against the ramp 266R and causes the ramp 266R to slide and therefore the locking member 266 to move towards the closed end 264C. Biasing element 265 may be resilient against the moving locking element 266 and keeps the locking element 266 against the actuator 268. When the connector 200 (not shown in Fig. 7A) is clamped by the attaching member 260, the actuator 268 may be disposed along the ramp 266R. As the actuator 268 may be adapted to be locked at any position along the hole 269H, the actuator 268 may be maintained on the ramp 266R to keep the locking member 266 locked onto the connector 200. To release the connector 200, the actuator 268 may be displaced away from the centre of the recess 266A, e.g. by rotating the actuator 268 counter-clockwise. Consequently, the grip between the flange 262F and the casing 264 will

be relaxed and the connector 200 may be removed therefrom. Biasing element 265 may assist in releasing the grip by pushing the locking member 266 away from the closed end 264C of the casing 264.

[0063] Fig. 8 shows a blown-up view of an example of the aluminium storage unit 10. Storage unit 10 may include the joint 12. Storage unit 10 may include a plurality of joints 12. Storage unit 10 may include a joint 12 at each corner of the storage unit 10, i.e. joints 12A,12B,12C,12D. Each of the plurality of joints 12 may include a connector, a first frame element and a second frame element. Connector 100 may be an elongated element. Connector 100 may be as long as the depth of the storage unit 10 such that the connector 100 may extend from the front of the storage unit 10 to the back of the storage unit 10. Connector 100 may have a first end 100X and a second end 100Y opposite the first end 100X. Connector 100 may include the base portion 104B and the cover 104C. First frame element 120 and the second frame element 140 may be connected to the base portion 104B of the connector 100.

[0064] A frame element, e.g. the first frame element 120, of one joint may be the frame element for another joint. For example, the first frame element 120 of joint 12A may be first frame element 120 of joint 12D, the second frame element 140 of joint 12A may be the second frame element 140 of joint 12B, so on and so forth. Each end of the frame element may be connected to a connector. First end 120F and second end 120S are used to denote the ends of the frame element and can be interchanged depending on the connector referred to. The same references may be applicable to the frame element between any two connectors. For example, first frame element 120 may be applicable to connector 12A and connector 12D.

[0065] First frame element 120 or the second frame element 140 may include a bar or a panel having a first end and a second end opposite the first end, such that the bar or panel may be connected to the connector 100 at the first end. As shown in Fig. 8, using the joint 12A as an example, the first frame element 120 may be a bar with the first end 120F and the second end 120S. First end 120F may be connected to connector 100 at the joint 12A and the second end 120S may be connected to the connector 100 at joint 12D. As shown in Fig. 8, the top panel 10T of the storage unit 10 may include a pair of bars 126B and a board attachable to and

between the pair of bars 126B. First frame element 120 may be the top panel 10T adapted to be connected to the connectors 100 at joints 12A,12D. Base panel 10B and each of the pair of side panels 10S may each include a pair of bars and a board disposed between the bars or a panel.

[0066] After the first frame element 120 and the second frame element 140 are connected to the base portion 104B of the connectors 100 of the joints 12A,12D, the cover 104C may be installed onto the base portion 104B. Thereafter, the end cap 106 may be installed to cover the first end 100X and/or the second end 100Y. Connector 100 may have an end cap 106 to cover each of the first end 100X and the second end 100Y. The back panel and the doors of the storage unit 10 may be installed subsequently.

[0067] As shown in Fig. 8, the storage unit 10 may include a shelving unit 10U disposed between the top panel 10T and the base panel 10B. Shelving unit 10U may be connected to and between the pair of side panels 10S. Shelving unit 10U may be parallel to the base panel 10B. Shelving unit 10U may have a first end 10UA and a second end 10UB opposite the first end 10UA. Shelving unit 10U may include an internal frame element 150 and a connector 100A at each end of the internal frame element 150. Connector 100A may be adapted to be connected to the second frame element 140 between the connectors 100 at joints 12A,12B and the second frame element 140 between the connectors 100 at joints 12D,12C. Storage unit 10 may include a support 152 mounted to each of the second frame elements 140. Support 152 may be adapted to support the shelving unit 10U. Support 152 may be studs attachable to the second frame element 140.

[0068] As shown in Fig. 8, the storage unit 10 may have frame elements of the same length. For example, the frame elements of the top panel 10T, the base panel 10B, the shelving unit 10U may be of the same length. Frame elements of the pair of side panels 10S may be of the same length. Although the width of the storage unit 10, i.e. the length of its top side, may be longer than shelving unit 10U, the connectors of the storage unit 10 allows panels of the same length to be used. Furthermore, in the event that length of the frame elements need to be altered, conventional cutting tools, e.g. circular saw, may be used to shorten the length of the frame element by cutting the frame perpendicularly across its width. In conventional

aluminium storage systems, where the frame elements need to be cut at an angle, e.g. 45 degrees, at the end, the frame elements need to be brought back to the factory to be altered using special cutting machines.

[0069] Fig. 8A shows an example of a support beam 10M that may be used for the storage unit 10. For example, in top panel 10T, base panel 10B, shelving unit 10U. Using the base panel 10B as an example, as shown in Fig. 8, the support beam 10M may be disposed between the pair of bars 126B. Support beam 10M may be elongated and may be attached to the connector 100 at one end 10MA and to another connector (not shown in Fig. 8A) at the other end 10MB. Support 10B may be disposed below the board 10R (not shown in Fig. 8A) and adapted to support the board 10R so that the base panel 10B can be configured to support a heavier load when need be.

[0070] Fig. 9 shows a blown-up view of an example of the aluminium storage unit 20. Aluminium storage unit 20 in Fig. 9 is similar to the aluminium storage unit 10 in Fig. 8 except that storage unit 20 incorporate the engaging members and attaching member as shown and described in Fig. 5. As shown in Fig. 9, the first frame element 220 may be a panel. Top panel 20T of the storage unit 20 may comprise of a plurality of frame members, e.g. the first frame members 220. Similarly, the base panel 20B and each of the pair of sides 20S may comprise of a plurality of frame members. Each joint, e.g. the joint 22A, may include a connector, e.g. the connector 200, a first frame element, e.g. the first frame element 220, and a second frame element, e.g. the second frame element 240, connected to the connector. Using the first frame element 220 as an example, to assemble the storage unit 20, the attaching member 260 may be inserted into and retained in the slot (not shown in Fig. 9) at the first end 220F of the first frame element 220 in the unlocking configuration. When the head 262 of the attaching member 260 is inserted into the first engaging member 210 of the joint 22A, the attaching member 260 may be operated into the locking configuration thereby locking the first frame member 220 to the connector 200 of joint 22A. As shown in Fig. 9, the top panel 20T may include another first frame element 220 connected to the connector 200 at the joint 22A. A frame element 221 may be connected to and between two first frame elements 220 without connecting to the connectors 200 of the joints 22A,22D. Another attaching member 260 may be inserted to the slot 226 at the second end 220S of the first

frame element 220 in the unlocking configuration. Similarly, the head 262 of the another attaching member 260 may be inserted into the first engaging member (not shown in Fig. 9) of the connector 200 of the joint 22D. Thereafter, the attaching member 260 may be operated into the locking configuration thereby locking the first frame member 220 to the connector 200 of the joint 22D. In this way, the top panel 20T of the storage unit 20 may be assembled. The same method may be used to assemble the base panel 20B and the pair of side panels 20S. Referring to Fig. 9, the frame elements of the top panel 20T, bottom panel 20B, and the shelving unit 20U may be of the same size. Similarly, the frame element of the pair of side panels 20S may be of the same size. In this way, the number of different parts required to assemble the storage unit 20 may be greatly reduced as many parts of the storage unit 20 are the same, e.g. frame element, attaching member. Further, the length of the frame elements may easily be altered on site. In addition, the aluminium storage unit 20 as shown Fig. 9 may be easily assembled as compared to a conventional aluminium storage unit. Aluminium storage unit 20 may include the shelving unit 20U.

[0071] Fig. 10 shows an example of the aluminium storage unit 30. Storage unit 30 is based on the examples of the aluminium storage unit 10 or aluminium storage unit 20. Storage unit 30 may include an opening 34 adapted to receive a protrusion into the storage unit 30. First frame elements 320 of the storage unit 30 may include pair of bars 326B. Pair of bars 326B may extend from the connector 300B1 to connector 300B2. Storage unit 30 may include a pair of support arms 328 extending from one of the pair of bars 326B to the other. Pair of support arms 328 may be slidable along the pair of bars 326B. Each of the pair of bars 326B may include an engaging member 326E extending along the length of the bar 326B. Engaging member 326E may be a channel extending along the bar 326B. Pair of arms 328 may include an attaching member 360 (not shown in Fig. 10) disposed at each end of each of the pair of arms 328. Each of the pair of arms 328 may include a slot (not shown in Fig. 10) to receive and retain the attaching member. Attaching member may be adapted to engage the engaging member 326E. Attaching member may be the attaching member 260 as described in Fig. 7A and 7B. Channel may be a bracket adapted to receive the head (not shown in Fig. 10) of the attaching member. Head of the attaching member 360 may be slotted into the bracket of the bar 326E in the unlocking configuration. In this configuration, the pair of support arms 328 may be slidable along the brackets of the pair of bar 326E. Once the positions of the pair of support arms 328 are determined, the attaching member 360 may be

operated into the locking configuration to lock the pair of support arms 328 into position. The pair of support arms 328 may be suitable for supporting parts of the storage unit 30, e.g. a sink for washing, that protrudes into the storage unit 30. As shown, the pair of support arms 328 may be adjustable to accommodate parts, e.g. sink, of varying sizes and provides the flexibility of adjusting the pair of support arms 328 to support those parts. Compared to conventional aluminium storage units, the support for the sink would not be adjustable due to the design limitation of such storage units. Storage unit 30 may be a floor standing unit. Storage unit 30 may include a base 300E adapted to support the storage unit 30 and elevate the storage unit 30 from the floor. Due to the connector and frame element configuration, it is possible to include further element to enhance the function of the storage unit 30, e.g. a recess panel.

[0072] Fig. 10A shows a sectional view of the aluminium storage unit 30 in Fig. 10. Storage unit 30 may include a recess panel 370 adapted to be disposed between two frame elements, e.g. the second frame elements between the pair of side panels 30S. Recess panel 370 may be disposed partially behind the doors 30D. Recess panel 370 may be useful for a user to open the doors 30D of the storage unit 30. Recess panel 370 may be adapted to allow the user's fingers to reach behind the doors 30D to open them.

[0073] Fig. 11 shows a sectional view of an example of the joint 42. Joint 42 may include the connector 400. Connector 400 may include the first engaging member 410 and the second engaging member 430 on the first face 400F and the second face 400S respectively. First engaging member 410 may be the fastener 412 adapted to fasten the first frame element 420 to the connector 400. Second engaging member 430 may include a channel 470, e.g. a bracket. Correspondingly, the first frame element 420 may include the retaining portion (not shown in Fig. 11) adapted to receive the first engaging member 410, i.e. the fastener 412, and the second frame element 440 may include the attaching member 460 adapted to be attached to the second engaging member 430. Alternatively, the first engaging member 410 may be the channel 470 and the second engaging member 430 may be the fastener 412. Correspondingly, the first frame element 420 may include the attaching member 460 and the second frame element 440 may include the retaining portion.

[0074] A panel may have a pair of planar surfaces and sides surfaces extending from one of the pair of planar surfaces to the other. Planar surfaces may be parallel to each other. For example, the panel may have a pair of rectangular planar surfaces and four side surfaces extending from one of the pair of planar surfaces to the other. Planar surfaces may have an area larger than any one of the side surfaces. Attaching surface may be one of the side surfaces. Planar surfaces may be parallel to a plane. Attaching surface may be perpendicular to the plane.

[0075] A skilled person would appreciate that the features described in one example may not be restricted to that example and may be combined with any one of the other examples.

Claim

1. An aluminium storage unit comprising
 - a joint comprising
 - a connector having a first face and a second face;
 - a first frame element having a pair of surfaces substantially parallel to each other, the first frame element comprises an attaching side perpendicular to the pair of surfaces, wherein each of the pair of surfaces has an area larger than the attaching side, and wherein the attaching side of the first frame element is attached to the first face; and
 - a second frame element having a pair of surfaces substantially parallel to each other, the second frame element comprises an attaching side perpendicular to the pair of surfaces, wherein each of the pair of surfaces has an area larger than the attaching side, and wherein the attaching side of the second frame element is attached to the second face.
2. The aluminium storage unit of claim 1, wherein the connector comprises a first engaging member connected to the first face, the first engaging member adapted to engage the first frame element and a second engaging member connected to the second face, the second engaging member adapted to engage the second frame element.
3. The aluminium storage unit of claim 1 or 2, wherein the connector comprises a tube comprising an external surface and an internal surface within the external surface, wherein the first face and the second face are part of the external surface.
4. The aluminium storage unit of claim 2 or 3, wherein each of the first frame element and the second frame element comprises an attaching member attachable to the first engaging member and the second engaging member respectively.
5. The aluminium storage unit of claim 4, wherein at least one of the first engaging member and the second engaging member comprises a channel extending along the first face or the second face respectively, wherein the attaching member comprises a head adapted to be engaged by the channel.

6. The aluminium storage unit of claim 4 or 5, wherein the attaching member is detachable from the first frame element or the second frame element.
7. The aluminium storage unit of any one of claims 4 to 6, wherein the attaching member is adapted to be operated between a locking configuration configured to lock the attaching member to the first engaging member or the second engaging member and an unlocking configuration configured to unlock the attaching member from the first engaging member or the second engaging member.
8. The aluminium storage unit of any one of claims 1 to 3, wherein the connector further comprises a first rear surface behind the first face and a second rear surface behind the second face, wherein the first rear surface and the second rear surface are part of the internal surface.
9. The aluminium storage unit of claim 8, wherein the connector comprises a base portion comprising the first face, the first rear surface, the second face and the second rear surface and a cover adapted to cover the first rear surface and the second rear surface.
10. The aluminium storage unit of claim 8 or 9, wherein the connector comprises a first through hole extending from the first rear surface to the first face and a second through hole extending from the second rear surface to the second face, wherein the first engaging member extends through the first through hole and the second engaging member extends through the second through hole.
11. The aluminium storage unit of any one of claims 8 to 10, wherein at least one of the first engaging member and second engaging member comprises a fastener adapted to fasten at least one of the first frame element and the second frame element to the connector.
12. The aluminium storage unit of any one of claims 1 to 11, wherein the first face is perpendicular to the second face.
13. The aluminium storage unit of any one of claims 1 to 12, wherein the first frame element or the second frame element comprises a bar or a panel having a first end and a

second end opposite the first end, wherein the bar or panel is connected to the connector at the first end.

14. The aluminium storage unit of any one of claims 1 to 13, wherein the connector comprises a first end and a second end opposite the first end, wherein the connector comprises an end cap adapted to cover each of the first end and the second end.

15. The aluminium storage unit of any one of claims 1 to 14, wherein the first frame element comprises a pair of bars, wherein the aluminium storage unit further comprises a pair of support arms extending from one of the pair of bars to the other, wherein the pair of arms are slidable along the pair of bars.