

CABINET FRAMEWORK FOR A FURNITURE CABINET

[0001] The present application relates to a cabinet framework or a furniture cabinet having the cabinet framework, such a kitchen or bathroom cabinet. It also relates to methods of making, installing, assembling, dismantling and recycling the cabinet framework or the furniture cabinet having the cabinet framework.

[0002] Known furniture cabinets are typically made of wooden boards (i.e. panels, carcasses). The wooden boards provide both structural support and partition. For example, Medium Density Fibreboard (MDF), as a type of particleboards, is an engineering wood product that is widely used in Europe for fabricating furniture cabinets since 1980s. The particleboards are often decorated with melamine based overlays for making finished furniture cabinets to be water resistant, fireproof or insect proof. In contrast, furniture cabinets in Asia are more commonly made of plywood because plywood is flexible, affordable, workable, reusable and locally manufactured. Plywood, in addition to its general high degree of strength, is also is resistant to cracking, shrinking, splitting, twisting and warping.

[0003] However, some disadvantages of using the wooded boards include:

- A. hazardous emissions from formaldehyde, which is used in preservatives for making the particleboards (e.g. MDF & plywood);
- B. difficulty in recycling the particle boards;
- C. structural failure due to particle boards' susceptibility to water or moisture resulting in bloating, expansion, wood rot, delamination etc.;
- D. low degree of flammability;
- E. heavy weight for handling;
- F. short period of life span at about ten years maximum even when used in dry and well ventilated place; and
- G. deformation or warping if exposed to fluctuating humidity or temperature.

[0004] For kitchen and/or bathroom, the particleboard-based boards tend to warp, decay and discolor within a few years of usage because of high moisture content of their usage ambient. Cost of replacing failing kitchen or bathroom cabinets can be costly, inconvenient and environmentally damaging.

[0005] The present application claims the priority of Singapore patent application SG201204670-2 that was filed on 22 June 2012. Subject matter or content of the earlier priority application is hereby incorporated entirely by reference.

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[0006] The present invention aims to provide a new and useful cabinet framework or a furniture cabinet having the cabinet framework, which overcomes or at least alleviates one or more of the above-mentioned disadvantages. Essential features of the invention are provided by one or more independent claims, whilst important features of the invention are presented by dependent claims.

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[0007] According to a first aspect of the invention, the present application provides a cabinet framework for a furniture cabinet. The cabinet framework comprises one or more supporting struts for providing structural support to the furniture cabinet. For example, the supporting struts establish edges or boundaries of the furniture cabinet. The cabinet framework also comprises one or more connecting struts connected to one or more of the supporting struts for securing position or/and giving structural support to the connecting strut. The cabinet framework further comprises one or more cabinet hinges mounted onto the one or more connecting struts for holding a cabinet door. The one or more connecting struts comprise a breadth for supporting an entire length/breadth of an arm, a leaf or an overlay (arm) of the one or more cabinet hinges. In other words, at least one of the connecting struts has an area or region that can securely receive or lock the cabinet hinge for holding a cabinet door. In most cases, since a bottom surface of the cabinet hinge is flat, the corresponding area or region is also even. For example, the breadth of the connecting strut is equal or wider/larger than a breadth of the arm for fortifying the cabinet hinge arm onto the connecting strut. As an alternative, two or more supporting struts may be bounded or connected together for providing the wider breadth in order to replace a single connecting strut. The cabinet frame work may optionally exclude the cabinet hinge because the cabinet hinge is usually a standard component, which can be supplied separately.

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[0008] The cabinet framework provides structural support of the furniture cabinet. Often, if the furniture cabinet has a cuboid or cubic profile, the supporting strut(s) and the connecting strut(s) are located at edges of the furniture cabinet such that the

cabinet framework can support plates as covering or shelves. Parts of the cabinet framework are corrosion, moisture or temperature variation resistant such that the cabinet frame work or the furniture cabinet is suitable to be used in kitchen, bathroom and toilet. Other than in domestic environments, the cabinet framework or the furniture cabinet can be used in yachts, airplanes and ships. A shelf or covering is alternatively termed as a panel, a carcass, a board, a plate, a layer or a sheet.

[0009] To provide the resistance to corrosion, moisture or temperature variation, exposed parts the framework are mostly coated, plated, made of corrosion and moisture resistant material(s). For example, the supporting struts and connecting struts are made of aluminum alloy or pure aluminum. Surfaces of the struts can be anodized, power-coated, or over-sprayed for enhancing the resistance or beautifying.

[0010] Although there are many types of hinges for fixing doors, furniture hinges usually include concealed hinges, barrel hinges, butt/mortise hinges, continuous hinges (piano hinges), butterfly hinges (parliament hinges), flag hinges, H hinges, HL hinges, counter-flap hinges, flush hinges, rising butt hinges, friction hinges, security hinges, cranked hinge or stormproof hinges, lift-off hinges and self-closing hinges. Due to their applications, the furniture hinges are also known as cabinet hinges for holding cabinet doors. The furniture hinges typically do not have much exposed parts after installation such that finished outlook of a finished kitchen cabinet will not tarnished by the exposed parts. Other types of hinges, which are not normally used for manufacturing furniture cabinets, include pivot hinges, strap hinges, coach hinges, double action spring hinges and Tee hinges. In particular, the concealed hinges are used worldwide for making furniture cabinets because the concealed hinges allows on-site adjustment and has almost no exposed part after installation. An existing product of the concealed hinge is marketed as CLIP top BLUMOTION™. Other known product names of the concealed hinges comprise soft-close BLUEMotion™ overlay hinges, overlay CLIP hinges, insert clip top 3-way hinges, soft-close BLUEMotion™ insert clip top hinges, snap close clip top insert hinges, face frame soft-closing concealed insert hinges, frameless soft-closing concealed insert hinges, etc.

[0011] A concealed hinge generally has a cup and an overlay that are connected together. The overlay may also be termed as arm, leaf or overlay arm. The cup has

two extensions (ears) for mounting the cup into a recess of corresponding shape in a door by screws. The overlay arm typically has an elongated cuboid form for screw-mounting onto a weight-bearing board or frame. Commonly available concealed hinges have their overlay arms at about 70mm or less. The concealed hinge has not
5 part exposed to exterior after closing a cabinet door, which is installed with the concealed hinge. When mounting, the concealed hinges do not require anchoring (e.g. screw tightening) at exterior parts of a furniture cabinet. Therefore, the concealed hinges are often adopted for making furniture cabinets that are visual appealing. Furniture cabinets with the concealed hinges can be closed seamlessly, preventing
10 intrusion of pests.

[0012] The breadth of the one or more connecting struts is sufficiently long for supporting a substantial portion or an entire length of the overlay arm. The breadth provides a dimension of a flat surface for fixing the furniture hinge or concealed hinge.
15 A small breadth, which provides a narrow area, cannot hold the overlay arm securely even with screw mounting. For the ease of manufacturing, the connecting strut can comprise an elongated flat area having the breadth. In practice, the breadth is made to be 70mm or less. A connecting strut having a breadth of 40mm to 70mm may also be sufficient. Since the supporting strut is narrower than the connecting strut, two or
20 more supporting struts may be connected in forming one connecting strut, although sometimes not economical.

[0013] The cabinet framework generally requires two types of struts, which is easy to manufacture, install, and manage for storage. The cabinet framework reduces
25 inventory of a cabinet builder such that supporting struts and connecting struts of different lengths can be fully utilized for making different cabinets or different parts of the furniture cabinet. Wastage of material and complexity of manufacturing are minimized so that manufacturing process of the cabinet framework can be flexibly arranged for catering to production volume change due to seasons. The struts can be
30 supplied in standard lengths, whilst cabinet framework of diverse sizes can be produced by using the struts of standard lengths with little wastage. For example, off-cuts of the struts can be used for making legs of furniture cabinets.

[0014] The one or more of the supporting struts comprises a first arm and a second arm that extend radially from a core of the one or more of the supporting struts. The first arm and the second arm form an elongated cavity between the arms in a longitudinal direction of the core. The arms may be known as fins that generally have thin plates extending radially from a longitudinal axis of the supporting strut. The radial extension of arms increases structural strength of the supporting strut without the requirement of having a solid and thick rod. Weight and cost of the supporting struts are thus reduced, which makes the cabinet framework affordable to consumers and easy to handle for installation technicians.

[0015] One or more of the arms may have radially remote ends (known as radial ends) further extend along a cylindrical circumference of the first arm or the second arm. The cylindrical circumferential extensions can be connected in forming a closed surface or open gap in the radial direction. In other words, the arms may be detached with the gap and the arms further extend in the longitudinal direction of the core or strut. In fact, neighboring arms with the gap form an elongated slot along in a length direction of the strut for providing a mounting site or housing for holding more components. If not used, the elongated slot or cavity can be filled with rubber gasket for providing continuous flat surface with high-class visual appearance. The elongated slot with the gap may be known as an open slot.

[0016] The one or more of the supporting struts can further comprise a third arm and a fourth arm that extends radially from the core of the one or more of the supporting struts respectively. Remote radial ends of the third arm and the fourth arm are connected in forming a cavity between the arms in a longitudinal direction of the core or supporting strut. The cavity also has an elongated shape over a length of the supporting strut, which may be known as close slot. The close slot can conceal electric cables or thin water tubes. Moreover, when exposed to exterior, the supporting strut with the close slot does not expose its recess for dust collection.

[0017] The one or more connecting strut may comprise a first core, a second core and a connecting plate. The connecting plate joins the two cores via two arms that extend radially from the two cores respectively. Visually, the connecting strut resembled two supporting struts joined together, except that the joint between them has a plate.

Effectively, the connecting strut provides a wide area by the plate, whilst the connecting strut still provides sufficient structural strength for supporting the cabinet framework.

- 5 [0018] The connecting plate can comprise a first plate and a second plate that provide opposite sides of the one or more connecting struts. The first and second plates may join extended arms extending from the first core and the second core respectively. Accordingly, the connecting strut may resemble a plank having two flat and smooth surfaces at opposite sides. The first and second plates can securely support objects
10 with broad width or length. For example, an overlay arm of a concealed hinge can be firmly screwed onto the connecting plate on any of the plates.

- [0019] The one or more connecting struts can further comprise a rib plate that extends between the first plate and the second plate for supporting. Since the first
15 and second plates form a chamber in-between, structure strength of the two plates may be comprised if the two plates are made thin. The rib plate can divide the chamber and support the two plates such that structural rigidity of the connecting strut is kept high for holding heavy door over long period of time. For example, the connecting strut having a breadth of 70mm can hold a cabinet door for more than ten
20 years, even over repeated closing and opening. In practice, the first plate, the second plate and the rib plate may be made with thickness of about 0.8~2mm (e.g. 1mm) when using aluminum alloy.

- [0020] The one or more of the supporting struts and the connecting strut(s) may be
25 made of metal or metal alloy. Metal or metal alloy typically has higher mechanical strength as compared to wooden rods or boards. Commonly used metal or metal alloy includes iron, steel, zinc, stainless steel, steel alloy and ferrous metal. Some of these metals or metal alloys need to be coated, treated or painted for resisting moisture or other sources of corrosion. As compared to engineering plastic materials, the strut of
30 metal or metal alloy can be recycled for protecting environment.

[0021] The metal or metal alloy can comprise aluminum or aluminum alloy respectively. Since aluminum is the most abundant metal on earth, supporting struts and connecting struts made of aluminum or aluminum alloy can be produced with

large volume at relatively low cost. Aluminum and its alloy are suitable for providing the struts with low weight and high corrosion resistance because aluminum has low density and the ability to resist corrosion due to the phenomenon of passivation. Aluminum and its notable alloys are easily machined such that the struts of diverse
5 structures can be made or processed at low cost and high speed. Aluminum is also almost 100% recyclable without any loss of its natural qualities such that unused or dismantled struts can be collected for recycling, bringing down cost to the consumers and lowering damage to the environment. Accordingly, the furniture cabinet of aluminum alloy may be known as ecofriendly cabinet.

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[0022] The core may comprise a cylindrical tube that has a wall thickness of at least 0.5mm for screw tightening. For example, the cylindrical tube can have a wall thickness of 0.5 to 1.5mm for thread-fastening. The cylindrical tube facilitates axial fastening of objects to the supporting strut or the connecting strut. For example, a
15 connecting strut may be joined to a supporting strut perpendicularly via a screw with flat head, which is commonly available.

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[0023] The cabinet framework can comprise a handle bar that includes a guiding rib for securing with one or more of the cavities. A side-profile (cross-section) of the
20 guiding rib can be complimentary to one cavity or two neighboring cavities such that handle bar can be slid into the cavities for locking its position. The handle bar provides a convenient hand-grip place to handle the cabinet framework or the furniture cabinet.

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[0024] The cabinet framework may further comprise a first leg for connecting to one or more of the supporting struts or the connecting strut(s) in order to support the cabinet framework. Multiple legs of similar shapes or structures may be provided balanced support to the cabinet framework. For example, four such legs are provided at four corners of the cabinet framework for lifting the cabinet framework off ground.

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Accordingly, the cabinet framework eases the cleaning of the ground and allows air circulation to the bottom of the cabinet framework.

[0025] The first leg can include one or more portions of the supporting struts, the connecting strut or both the supporting strut and the connecting strut. In other words,

the first leg can utilize extended portion or remote ends of the struts for lifting the cabinet framework off ground. Additional accessories may be avoided for the reduction of inventory.

- 5 [0026] The cabinet framework may further comprise a first supporting screw set that includes a first supporting screw with a shank for inserting into the cavity. The shank or the first supporting screw has an elongated body that matches the profile of the cavity. When in use, the shank or the first supporting screw can snugly or contiguously contact walls or arms of the struts for providing secure support with little
10 tolerance. If a diameter of the first supporting screw or the shank is larger than the gap of the cavity, the first supporting screw can prevent lifting or dropping of a supported strut. If the diameter of the first supporting screw or the shank is made smaller than the gap of the cavity, the supported strut can be snapped onto the first supporting screw easily, without using tools.

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- [0027] The first supporting screw set can further comprise a first supporting nut. The first supporting nut has a side profile or cross-sectional shape matching the cavity for securing the first supporting screw set. Hence, one or more of the cavities can receive both the shank (or first supporting screw) and the nut, which make the first supporting
20 screw set versatile for joining struts with different manners.

- [0028] The cabinet framework may further comprise a first corner joint having arms perpendicular to each other. One or more of the arms have a side profile (cross-section) matching the cavity. Accordingly, the first corner joint has L-shape for
25 inserting into struts longitudinally. The first corner joint can further have three arms that are also perpendicular to each other. Both the first corner joint and the first supporting screw set can connect the strut in making one cabinet framework, or joining several cabinet frameworks.

- 30 [0029] The one or more cabinet hinges can comprise a concealed hinge. Currently, the concealed hinges are supplied in the market with standard specifications. The cabinet framework can thus be made across different continents or mass produced. The concealed hinges also facilities cabinet users to adjust, repair or replace cabinet doors with ease.

[0030] The cabinet framework may further comprise a damper for soft-closing. The damper enables smooth and silent closing of cabinet door. The damper can either be a separate piece or integrated with the cabinet hinge for ease of installation.

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[0031] The cabinet framework can further comprise a draw runner for sliding a drawer into or out of the cabinet framework. The draw runner is also known as a draw slider for allowing insertion of a drawer into the cabinet framework. Often, two draw runners are provided at opposite edges of a drawer for extending the drawer. The damper may be further installed or integrated with draw runner.

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[0032] The cabinet framework may further comprise an array of LED (Light-Emitting Diode) lights that is installed into the cavity. Electric cables that are connected to the LEDs (LED lights) can further be held inside the cavity. The array of LEDs provides illumination to the furniture cabinet, which may further provide external lighting to surrounding areas of the furniture cabinet. The array of LED lights may be connected to an electronic circuit or an ambient sensor (light or sound sensor) for continuous, pulsed or colored illumination.

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[0033] The present application can provide a furniture cabinet that comprises the cabinet framework and a board for covering one side of the cabinet framework. The board may cover one or more sides of the cabinet frame work for holding household objects, such as glasses, cutleries and food trays. The board can further provide partition to the cabinet framework as a shelf, providing more compartments to the furniture cabinet.

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[0034] The furniture cabinet may further comprise a cabinet door that is joined to the one or more connecting struts via the cabinet hinge. The cabinet door provides a detachable closing to the furniture cabinet so that items inside the furniture cabinet can be accessed. Since the cabinet door is usually installed on a front side of the furniture cabinet, the cabinet door is sometimes called front door. The furniture cabinet can have multiple such cabinet doors, either for the whole furniture cabinet or some compartment(s).

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[0035] According to a second aspect of the invention, the present application provides a method for making a furniture cabinet or cabinet framework. The method comprises a first step of providing supporting struts, a second step of supplying one or more connecting struts for connecting to one or more of the supporting struts, and a third
5 step of mounting one or more cabinet hinges onto the one or more connecting struts for holding a cabinet door. Some of these steps may be changed in sequence for convenience of making. The present method includes simple steps that are easily learned by technicians or even DIY (Do-It-Yourself) enthusiasts. Manufacturers of the furniture cabinet or cabinet framework require less number of skilled workers so that
10 the cost of making the furniture cabinet or cabinet framework is low.

[0036] According to a third aspect of the invention, the present application provides a method for installing a furniture cabinet. The method comprises a first step of providing the cabinet framework, and a second step of joining one of the supporting
15 struts or the one or more connecting struts to a wall for fixing. The installation can utilize mature techniques, such as using Tasselli wall plugs or anchor bolts.

[0037] According to a fourth aspect of the invention, the present application provides a method for refurbishing or repairing the furniture cabinet. The method comprises a
20 step of replacing the board or the array of LED lights with another piece. Over a period of usage, the board or the array of LED lights may be failing. An owner or a technician of the furniture cabinet can remove the failing part (board or LEDs) and attach a new piece. The replacement of the board or the array of LED lights provides a fresh outlook to the furniture cabinet with ease. Conventionally, an entire furniture
25 cabinet is hacked off, which incur high cost, intense labor and big wastage.

[0038] According to a fifth aspect of the invention, the present application provides a method for recycling a furniture cabinet. The method comprises a step of removing one or more fasteners from the furniture cabinet or cabinet framework such that the
30 supporting struts, the one or more connecting struts and the cabinet door(s) can be taken apart. The struts and other parts can be compiled for material recycling. In the case that the struts are made of aluminum or aluminum alloy, 10% of the value may be returned to owner of the furniture cabinet or cabinet framework, which provide good incentive for protecting environment.

[0039] The accompanying figures (Fig.) illustrate embodiments and serve to explain principles of the disclosed embodiments. It is to be understood, however, that these figures are presented for purposes of illustration only, and not for defining limits of
 5 relevant inventions.

[0040] Fig. 1 illustrates a kitchen cabinet that is exposed for showing its structure;

Fig. 2 illustrates an isotropic view of a supporting strut;

Fig. 3 illustrates a cross-section view of the supporting strut;

10 Fig. 4 illustrates an isotropic view of a connecting strut;

Fig. 5 illustrates a cross-section view of the connecting strut;

Fig. 6 illustrates a handle of the kitchen cabinet;

Fig. 7 illustrates a multi-block for anchoring shelves;

Fig. 8 illustrates an exploded view of a leg of the kitchen cabinet;

15 Fig. 9 illustrates a knuckle foot of the leg;

Fig. 10 illustrates a first joint of the kitchen cabinet;

Fig. 11 illustrates screw sets of the kitchen cabinet;

Fig. 12 illustrates an exploded view of a second joint of the kitchen cabinet;

Fig. 13 illustrates the second joint in an assembled form;

20 Fig. 14 illustrates an exploded view of cabinet door; and

Fig. 15 illustrates a top-hung kitchen cabinet.

[0041] Exemplary, non-limiting embodiments of the present application are described with references to the above-mentioned figures. In particular, Figures 1-14 provides
 25 detailed structures of a first embodiment, whilst Fig. 15 offers to explain a second embodiment.

[0042] In particular, Figure 1 illustrates a kitchen cabinet 30 that is exposed for showing its structure. The kitchen cabinet 30 comprises a front door 32, a cabinet
 30 framework 34 and two concealed hinges 36, 38 that connect the front door 32 to the cabinet framework 34. The kitchen cabinet 30 has a cuboid shape (rectangular prism profile), whilst the front door 32 is configured to be rotated along axes of the two concealed hinges 36, 38 for closing or opening a front side 39 of the kitchen cabinet 30. In particular, the first concealed hinge 36 and the second concealed hinge 38

have a first arm 41 and a second arm 43 respectively, which are both fixed onto the first connecting strut 50.

[0043] The front door 32 further comprises four door struts 40, 42, 44, 46 and a decoration plate 48. The four door struts 40-46 consist of a first door strut 40, a second door strut 42, a third door strut 44 and a fourth door strut 46 that are sequentially joined together and attached to the decoration plate 48. The decoration plate 48 is made of Perspex and glued to a common side of the four door struts 42-46. Detailed structure of the front door 32 is further shown in Fig. 14.

[0044] The cabinet framework 34 comprises a first connecting strut 50, a second connecting strut 52, a first supporting strut 54, a second supporting strut 56, a third supporting strut 58, a fourth supporting strut 60, a fifth supporting strut 62, a sixth supporting strut 64, a seventh supporting strut 66 and an eighth supporting strut 68. The cabinet framework further comprises a handle bar 70, a first leg strut 72, a second leg strut 74, a third leg strut 76 and a fourth leg strut 78. Both the fourth leg strut 78 and the first leg strut 72 extends from floor to the fourth supporting strut 60 and the second supporting strut 56 respectively over short distances. In contrast, both the second leg strut 74 and the third leg strut 76 extend over almost an entire height of the kitchen cabinet 30. The four leg struts 72-78 have a first knuckle foot 80, a second knuckle foot 82, a third knuckle foot 84 (hidden by the shelves) and a fourth knuckle foot 86 attached to them respectively. Moreover, an array of LEDs (Light-Emitting Diode) 88 is inserted into a bottom side of the seventh supporting strut 66. In contrast, the handle bar 70 is slotted onto the fifth supporting strut 62, which is on an opposite side of the seventh supporting strut 66. A first shelf 89 is placed at bottom of the kitchen cabinet 30 as secured onto the first supporting strut 54, the second supporting strut 56, the third supporting strut 58 and the fourth supporting strut 60 via four multi-blocks 93 (not shown). A second shelf 91 is held substantially at middle height positions of the first connecting strut 50, the second connecting strut 52, the second leg strut 74 and the third leg strut 76 via four multi-blocks 93.

[0045] Fig. 2 illustrates an isotropic view of the first supporting strut 54. Fig. 3 illustrates a cross-section view of the supporting strut 50. Other supporting struts 56-

68 have structures that are similar to the first supporting strut 54. Description of corresponding structures is therefore incorporated wherever relevant.

[0046] The first supporting strut 54 is made of aluminum alloy that resembles an elongated rod. The cross-section view of the first supporting strut 54 shows a first breadth 55 of 20mm (millimeters), a width 57 (second breadth) of 20mm and a length 59 of 525mm. The first supporting strut 54 includes a first arm 90, a second arm 92, a third arm 94 and a fourth arm 96 that extend from a cylindrical tube 98 of the first supporting strut 54 radially. Each of the arms 90-96 has two radial ends 91, 93. The cylindrical tube 98 has an inner diameter of 5mm and wall thickness of 1.5mm. The first arm 90 and the second arm 92 have their ends joined together in forming a first cavity 100 throughout the entire length 59 of the first supporting rod 50. In contrast, the second arm 92 and the third arm 94 form a second cavity 102 in-between with a gap 95 between their open ends at 5mm. The third arm 94 and the fourth arm 96 form a third cavity 104 between the arms 94, 96 with a gap 95 between their open ends at 5mm. Finally, the fourth arm 96 and the first arm 90 form a fourth cavity 106 and have a gap 95 of 5mm between ends of the arms 96, 90. All the cavities 100-106, the arms 90-96 and the centrally located cylindrical tube 98 extend throughout the entire length 59 of the first supporting rod 50.

[0047] Fig. 4 illustrates an isotropic view of the first connecting strut 50, whilst Fig. 5 illustrates a cross-section view of the first connecting strut 50. The cross-section view of the first connecting strut 50 shows a third breadth 61 of 70mm (millimeters) and a fourth breadth (width) 63 of 20mm. Here, the first connecting strut 50 is only partially shown. The second connecting strut 52 has structures that are similar to the first connecting strut. Description of corresponding structures is therefore incorporated wherever relevant. The first connecting strut 50 comprises a first pillar 108 and a second pillar 110 that are linked together by plates 112, 114 at opposite sides such that the first connecting strut 50 has a generally cuboid shape. Both the first pillar 108 and the second pillar 110 have structures that are similar to the first supporting strut 54.

[0048] More specially, the second pillar 110 includes a fifth arm 116, a sixth arm 118, a seventh arm 120 and an eighth arm 122 that extend from a second cylindrical tube

124 of the first supporting strut 54 radially. Likewise, a first cylindrical tube 98 (also known as cylinder tube) of the first pillar 108 is formed at the core of the four arms 90-96. The second cylindrical tube 124 has an inner diameter of 5mm and wall thickness of 1.5mm. The fifth arm 116 and the sixth arm 118 have their ends joined together in
 5 forming a fifth cavity 126 throughout the entire length of the first connecting rod 50. In contrast, the sixth arm 118 and the seventh arm 120 form a sixth cavity 128 in-between with a gap 95 between their open ends at 5mm. The seventh arm 120 and the eighth arm 122 form a seventh cavity 130 between the arms 120, 122 with a gap 95 between their open ends at 5mm.

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[0049] Ends of the eighth arm 122 and the third arm 94 are connected together by the second plate 114, whilst ends of the second arm 92 and the fifth arm 116 are linked together by the first plate 112. The first connecting strut has a rib plate 132 that divides an internal space between the first pillar 108 and the second pillar 110 equally.
 15 Hence, the first plate 112, the second arm 92 92, the cylindrical tube 98, the third arm 94 the second plate 114 and rib plate 132 encloses a first chamber 134, whilst the first plate 112, the rib plate 132, the second plate 114, the eighth arm 122, the second cylindrical tube 124 and the fifth arm 116. All the cavities 100-106 & 126-130, the arms 90-96 & 116-122, the centrally located cylindrical tubes 98, 124, the plates 112,
 20 114 and the rib plate 132 extend throughout the entire length of the first connecting strut 50.

[0050] Fig. 6 illustrates the handle 70 of the kitchen cabinet 30. The handle 70 is partially shown, and having a generally bent plate 138 as its body. The handle 70 also
 25 has three ribs 140-144 on a backside 146 of the handle 70. The three ribs 140-144 extend in a longitudinal (length) direction of the handle 70 over its entire length. The handle 70 further has a handle grip 148 extending towards a front side 150 of the handle 70, which is also a front side of the kitchen cabinet 30. The three ribs 140-144 include a first guiding rib 140 and a second guiding rib 142 such that the guiding
 30 ribs 140, 142 have an outer distance of 5mm for inserting guiding ribs 140, 142 into the cavities 100-104 of the fifth supporting strut 62. A supporting rib 144 of the handle 70 protrudes from the backside 146 slightly such that the handle 70 has rigid backing after the insertion or kitchen cabinet installation.

[0051] Fig. 7 illustrates a multi-block 93 for anchoring shelves 89, 91. The multi-block 93 has holes for securing screws and an extension for supporting the shelves 89, 91.

[0052] Fig. 8 illustrates an exploded view of a first leg 180 of the kitchen cabinet 30. The first leg 180 comprises the first leg strut 72, first knuckle foot 80 and a first tightening screw 182. The first leg strut 72 is perpendicularly aligned to the second supporting strut 56 such that the first tightening screw 182 passes through a core 98 (cylindrical tube, not shown) of the second supporting strut 56 and is fastened to a core (cylindrical tube 98) of the first leg strut 72. The first knuckle foot 80 is fastened to the first leg strut 72 from bottom of the first leg strut 72, which is on an opposite side of the first leg strut 72.

[0053] Fig. 9 illustrates the first knuckle foot 80 of the first leg 180. The first knuckle foot 80 comprises a bolt 184, a conical base 186, an adjusting nut 188 and a locking nut 190. The bolt 184 is threaded such that the bolt 184 is be screwed into the core 98 (cylindrical tube) of the first leg strut 72. The bolt 184 is fixed to the conical base 186, whilst both the adjusting nut 188 and the locking nut 190 can move along the bolt 184 by rotating themselves via screwing.

[0054] Fig. 10 illustrates a first joint 192 of the kitchen cabinet 30, which is partially assembled. The first joint 192 of Fig. 10 shows a seventh supporting strut 66 and the third leg strut 76 that are connected together by a tightening screw (not shown), similar to the first tightening screw 182. Moreover, the first joint 192 further comprises a first supporting screw set 194.

[0055] Fig. 11 illustrates the first supporting screw set 194 of the kitchen cabinet 30. The first supporting screw set 194 comprises a first supporting screw 196 and a first supporting nut 198 that cooperate with each other via screw threads. The first supporting screw 196 has a hex socket for Allen key. Parts 196, 198 of the first supporting screw set 194 are connected in an assembled mode 200, or separated in disassembled mode 202. In the assembled mode 200, as also shown in Fig. 10, the first supporting nut 198 is inserted into a longitudinal cavity 100-106 of the third leg strut 76 for fixing. An external cross-sectional profile of the first supporting nut 198 matches profiles of the cavities 100-106.

[0056] Fig. 12 illustrates an exploded view of the first joint 192 of the kitchen cabinet 30. The first joint 192 of Fig. 12 further comprises the eighth supporting strut 68, a first corner joint 204 and a second corner joint 206. The two corner joints 204, 206 have identical shapes such that they may be termed commonly as “corner joint” 204, 206. A profile of the first corner joint 204 resembles the alphabet “L” such that the first corner joint 204 has two extensions 205, 207, which are joined at their ends and perpendicular to each other. The extensions 205, 207 have through holes 210, 212 respectively. The two extensions 205, 207 consist of a first extension 205 and a second extension 207, which are also known as arms 205, 207. Accordingly, Fig. 12 also shows an extension 205 of the second corner joint 206 has an exposed through hole 208 for receiving a screw head. Cross-sections of the extensions match profiles of the cavities 100-106 & 126-130. According to Fig. 12, the seventh supporting strut 66 is fastened to the third leg strut 76 via the second corner joint 206. Extensions of the second corner joint 206 are inserted into cavities 104 of the seventh supporting strut 66 and the third leg strut 76 respectively. A tightening screw 182 is inserted into the through hole 208 of the second corner joint 206 for fixing the third leg strut 76 and the seventh supporting strut 66 together. The first corner joint 204 connects the eighth supporting strut 68 and the third leg strut 76 in similar ways. Fig. 13 illustrates the second joint 192 in an assembled form.

[0057] Fig. 14 illustrates an exploded view of the front door 32, which is also known as a cabinet door 32. The cabinet door 32 comprises a first insert 214, a second insert 216, a third insert 218 and a fourth insert 220 for joining the first door strut 40, the second door strut 42, the third door strut 44 and the fourth door strut 46 together. In particular, all the door struts 40-46 are hollow such that arms or extensions of the inserts 214-220 can be inserted into the door struts 40-46 respectively.

[0058] When assembling, the door struts 40-46, the connecting struts 50, 52, the supporting struts 54-68, 72-78 and other parts are cut to predetermined shapes and lengths. Concealed hinges 36, 38 and tightening screws 182 are further made available at a manufacturing site (e.g. a kitchen under renovation). The third door strut 44 is cut with two pockets for receiving heads of the concealed hinges 36, 38.

[0059] The door struts 40-46 are connected together according to Fig. 14, whilst the two pockets are provided in the third door strut 44. Once connected together, the door struts 40-46 is glued with the decoration plate 48 at their common sides.

5 [0060] The connecting struts 50, 52, the supporting struts 54-68, 72-78 and other parts are affixed together according to the cabinet framework 34 of Fig. 1. Particularly, a number of tightening screws 182, supporting screw sets 194 and corner joints 204, 206 are utilized for connecting the connecting struts 50, 52 and the supporting struts 54-68, 72-78 in forming the cabinet framework 34. The cabinet framework 34 includes
10 the array of LEDs 88 inserted into a third cavity 104 of the seventh supporting strut 66, and the handle bar 70 attached to the fifth supporting strut 62. The completed framework 34 further includes the four knuckle feet 80-86 that are linked to their respective struts 72, 74, 76, 78 in forming legs 180.

15 [0061] On the connecting struts 50, 52 and the leg struts 74, 76, several multi-blocks 93 are screw-tightened such that the two shelves 89, 91 can be secured onto them 93. On the other hand, the first concealed hinge 36 and the second concealed hinge 38 are attached to the third door strut 44 at the precut pockets with screw-tightening. The cabinet door 32 (front door), together with mounted concealed hinges 36, 38 are
20 rotatably connected to the first connecting strut 50 via tightening screws 182. Since the first connecting strut 50 has the third breadth 61 of 70mm, entire hinge arms of the concealed hinges 36, 38 are fully supported by the connecting strut 50 for secure anchoring. With minor adjustment, the front door 32 is fixed onto the framework 34 for making the kitchen cabinet 30.

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[0062] When performing face-lift to the kitchen cabinet 30, a solvent (not shown) is sprayed onto the joints between the decoration plate 48 and the four door struts 40-46, which dissolves the glue. After curing, a thin blade (not shown) is pierced into the joint such that the decoration plate 48 is lifted away from the four door struts 40-46. The
30 four door struts 40-46 are subsequently polished without disturbing structure of cabinet door 32. After the cleaning, fresh glue is applied onto the common side of the four struts 40-46 such that a new decoration plate 48 is attached to the common side after predetermined period of time. Accordingly, the kitchen cabinet 30 obtains a new facade after the face-lift. Depending on individual preference, the replacement of

decoration plate 48 (face-lift or renovation) can either be done while the kitchen door 32 is attached to the cabinet framework 34, or when the kitchen door 32 is detached from the cabinet framework 34.

5 [0063] When dismantling the kitchen cabinet 30, fasteners, which include the tightening screws 182, the knuckle feet 80-86, the corner joints 204, 206, the multi-blocks 93, the supporting screw sets 194, are firstly removed from the kitchen cabinet 30. Subsequently, the concealed hinges 36, 38, the inserts 214-216 and the array of LED lights 88 are stripped away such that a first type 222 of (wide) struts 50, 52 and a
10 second type 224 of (narrow) struts 54-60, 62-68, 74, 76 are taken apart. The two types of struts 222, 224 are made of aluminum alloy, and they are afterwards collected for recycling.

[0064] Fig. 15 illustrates a top-hung kitchen cabinet 250. The top-hung kitchen cabinet
15 250 has parts that are similar to the kitchen cabinet 30 of Figs. 1-4. Description of corresponding parts is therefore incorporated here wherever relevant.

[0065] In particular, the top-hung kitchen cabinet 250 comprises a first top hung hinge 252 and a second top hung hinge 254. A main body of the first top hung hinge 252 is
20 secured onto a first connecting strut 50 of the top-hung kitchen cabinet 250, whilst a main body of the second top hung hinge 254 is fastened to a second connecting strut 52 of the top-hung kitchen cabinet 250. The first top hung hinge 252 has first extension arm 256 connecting to a third door strut 44 of a cabinet door 32, whilst the second top hung hinge 254 have a second extension arm 258 connecting to a first
25 door strut 40 of the cabinet door 32. Both the top hung hinges 252, 254 can resist slam-closing of the cabinet door 32 such that both closing and opening of the cabinet door 32 becomes graceful, silent, precise and elegant.

[0066] In the application, unless specified otherwise, the terms "comprising",
30 "comprise", and grammatical variants thereof, intended to represent "open" or "inclusive" language such that they include recited elements but also permit inclusion of additional, non-explicitly recited elements.

[0067] As used herein, the term "about", in the context of concentrations of components of the formulations, typically means +/- 5% of the stated value, more typically +/- 4% of the stated value, more typically +/- 3% of the stated value, more typically, +/- 2% of the stated value, even more typically +/- 1% of the stated value, and even more typically +/- 0.5% of the stated value.

[0068] Throughout this disclosure, certain embodiments may be disclosed in a range format. The description in range format is merely for convenience and brevity and should not be construed as an inflexible limitation on the scope of the disclosed ranges. Accordingly, the description of a range should be considered to have specifically disclosed all the possible sub-ranges as well as individual numerical values within that range. For example, description of a range such as from 1 to 6 should be considered to have specifically disclosed sub-ranges such as from 1 to 3, from 1 to 4, from 1 to 5, from 2 to 4, from 2 to 6, from 3 to 6 etc., as well as individual numbers within that range, for example, 1, 2, 3, 4, 5, and 6. This applies regardless of the breadth of the range.

[0069] It will be apparent that various other modifications and adaptations of the application will be apparent to the person skilled in the art after reading the foregoing disclosure without departing from the spirit and scope of the application and it is intended that all such modifications and adaptations come within the scope of the appended claims.

Claims

1. Cabinet framework for a furniture cabinet, the cabinet framework comprising:
- supporting struts for providing structural support to the furniture cabinet,
 - 5 – at least one connecting strut connected to at least one of the supporting struts for securing, and
 - at least one cabinet hinge mounted onto the at least one connecting struts for holding a cabinet door,
- wherein the at least one connecting strut comprises a breadth for supporting
- 10 an arm of the at least one cabinet hinge; and
- wherein the at least one connecting strut comprises a first core, a second core and a connecting plate, the connecting plate joining the two cores via two arms extending radially from the two cores respectively.
- 15 2. Cabinet framework of Claim 1, wherein
- The at least one of the supporting struts comprise a first arm and a second arm that extend radially from a core of the at least one of the supporting struts, the first arm and the second arm forming a cavity between the arms.
- 20 3. Cabinet framework of Claim 2, wherein
- radial ends of the first arm and the second arm are detached with a gap.
4. Cabinet framework of any of the preceding Claims, wherein
- 25 The at least one of the supporting struts further comprises a third arm and a fourth arm that extend radially from the core of the at least one of the supporting struts, radial ends of the third arm and the fourth arm being connected in forming a cavity between the arms.
5. Cabinet framework of Claim 5, wherein
- 30 The connecting plate comprises a first plate and a second plate that provide opposite sides of the at least one connecting strut.

6. Cabinet framework of any of the preceding claims, wherein
At least one of the supporting struts and the connecting strut are made of metal
or metal alloy.
- 5
7. Cabinet framework of Claim 7, wherein
The metal or metal alloy comprises aluminum material respectively.
8. Cabinet framework of any of the preceding Claims 2 to 5, wherein
The core comprises a cylindrical tube having a wall thickness of at least 0.5mm
for screw tightening.
- 10
9. Cabinet framework of any of the preceding claims further comprising
A handle bar that comprises a guiding rib for securing with the cavities.
- 15
10. Cabinet framework of any of the preceding claims further comprising
A first leg for connecting to at least one of the supporting struts or the
connecting strut in order to support the cabinet framework.
- 20
11. Cabinet framework of Claim 11, wherein
The first leg comprises at least a portion of the supporting struts, the
connecting strut or both.
12. Cabinet framework of any of the preceding claims further comprising
A first supporting screw set that includes a first supporting screw for inserting
into the cavity.
- 25
13. Cabinet framework of Claim 13, wherein
the first supporting screw set further comprises a first supporting nut, the first
supporting nut having a side profile matching the cavity for securing the first
supporting screw set.
- 30

14. Cabinet framework of any of the preceding claims further comprising
A first corner joint having arms perpendicular to each other, at least one of the
arms having a side profile matching the cavity.
- 5
15. Cabinet framework of any of the preceding claims, wherein
The at least one cabinet hinge comprises a concealed hinge.
16. Cabinet framework of any of the preceding claims further comprising
A damper for soft-closing.
- 10
17. Cabinet framework of any of the preceding claims further comprising
A draw runner for sliding a drawer into or out of the cabinet framework.
18. Cabinet framework of any of the preceding claims further comprising
An array of LED lights that is installed into the cavity.
- 15
19. Furniture cabinet comprising:
The cabinet framework of any of the preceding claims, and
A board for covering one side of the cabinet framework.
- 20
20. Furniture cabinet of Claim 20 further comprising
A cabinet door that is joined to the at least one connecting strut via the cabinet
hinge.
- 25
21. Method of making a furniture cabinet comprising:
- Providing supporting struts,
 - Supplying at least one connecting strut for connecting to at least one of
the supporting struts, and
 - Mounting at least one cabinet hinge onto the at least one connecting
struts for holding a cabinet door;
- 30
- Wherein the at least one connecting strut comprises a first core, a second
core and a connecting plate, the connecting plate joining the two cores via
two arms extending radially from the two cores respectively.

22. Method of installing a furniture cabinet comprising
- Providing a cabinet framework according to one of the preceding claims 1 to 19, and
 - 5 – Joining one of the supporting struts or the at least one connecting strut to a wall for fixing.
23. Method of refurbishing or repairing the furniture cabinet of Claim 20 or 21 comprising
- 10 replacing the board or the array of LED lights with another piece.
24. Method of recycling a furniture cabinet comprising
- 15 Removing at least one fasteners from the furniture cabinet or the cabinet framework such that the supporting struts, the at least one connecting strut and the cabinet doors can be taken apart,
- wherein the at least one connecting strut comprises a first core, a second core and a connecting plate, the connecting plate joining the two cores via two arms extending radially from the two cores respectively.