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(54) **CORNER MEMBER FOR A SUPPORTIVE FRAME ASSEMBLY**

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A63B 22/00	(2006.01)
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(Continued)

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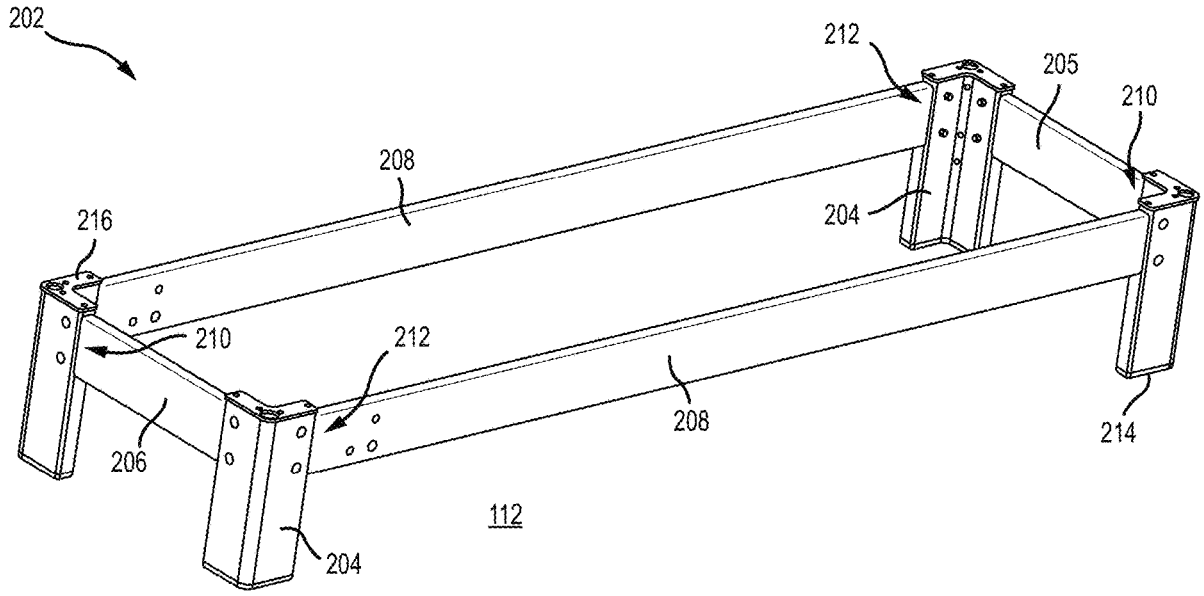
(57) **ABSTRACT**

A frame corner member includes an elongated hollow extrusion having a central corner portion and two leg portions extending from the central portion. Each leg portion includes an inner side wall spaced from and parallel to an outer side wall, and merging with the central portion. An outer end wall joins the inner and outer side walls, which each include an inner surface facing the inner surface of the other side wall. An opening through the outer end wall defines a space between the inner and outer side walls adjacent one end of the extrusion for receiving one end of one of frame side members and end members. At least one of the inner surfaces in the space has discrete surface features adapted to grip and retain the one end of one of the side members and end members in the space when received through the opening.

14 Claims, 6 Drawing Sheets



(51) **Int. Cl.**
F16B 12/14 (2006.01)
A63B 21/00 (2006.01)

(52) **U.S. Cl.**
CPC ***F16B 12/40*** (2013.01); ***F16B 12/52*** (2013.01); *A47B 95/043* (2013.01); *A63B 21/00065* (2013.01); *A63B 21/4029* (2015.10); *F16B 12/14* (2013.01)

(58) **Field of Classification Search**
CPC F16B 12/44; F16B 2012/443; F16B 12/46; F16B 12/48; F16B 12/50; F16B 12/52; F16B 12/54; F16B 12/60; F16B 12/28; F16B 2012/145; A47B 91/00; A47B 95/043
USPC 248/188.8, 188
See application file for complete search history.

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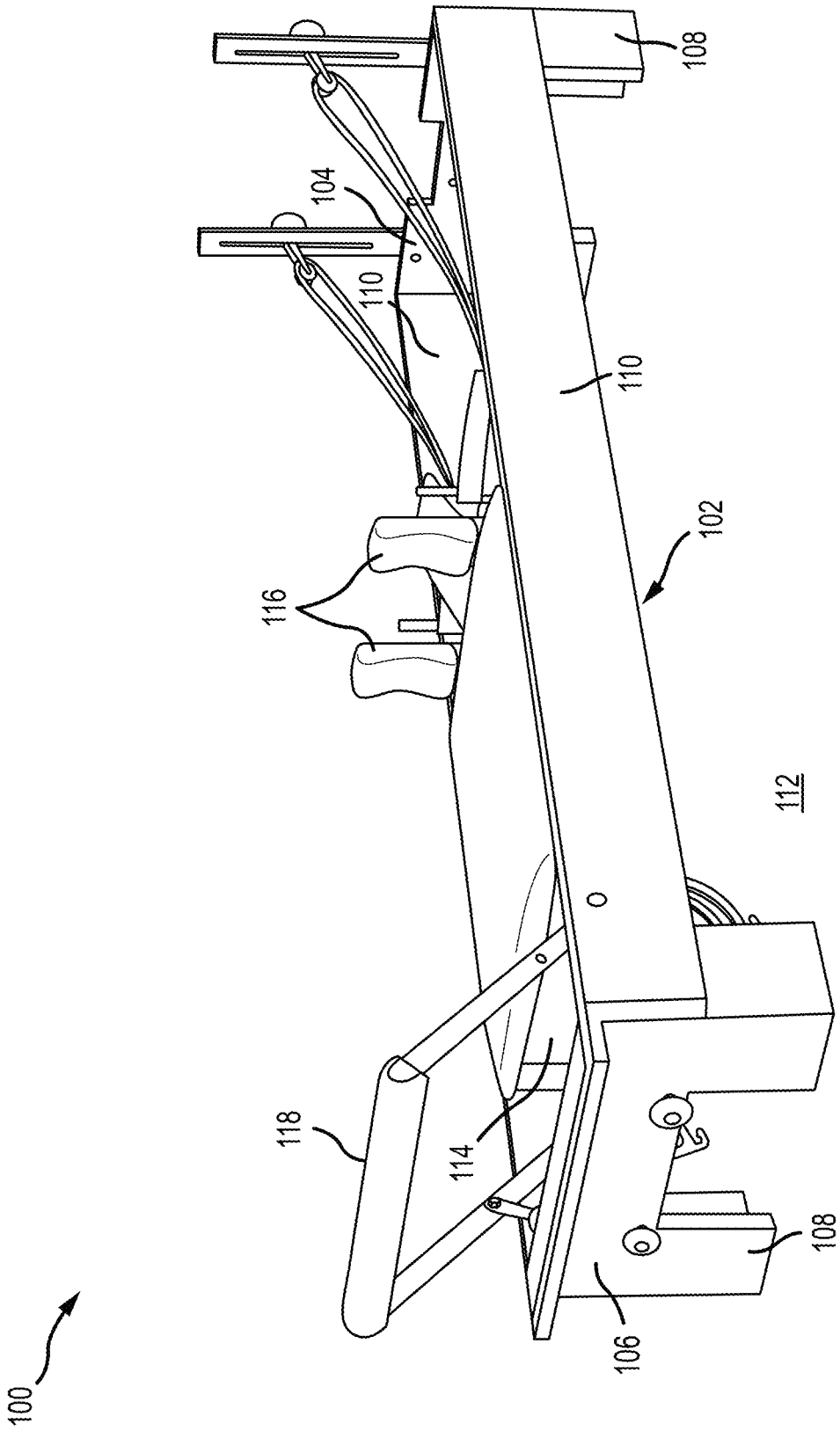


FIG.1
(PRIOR ART)

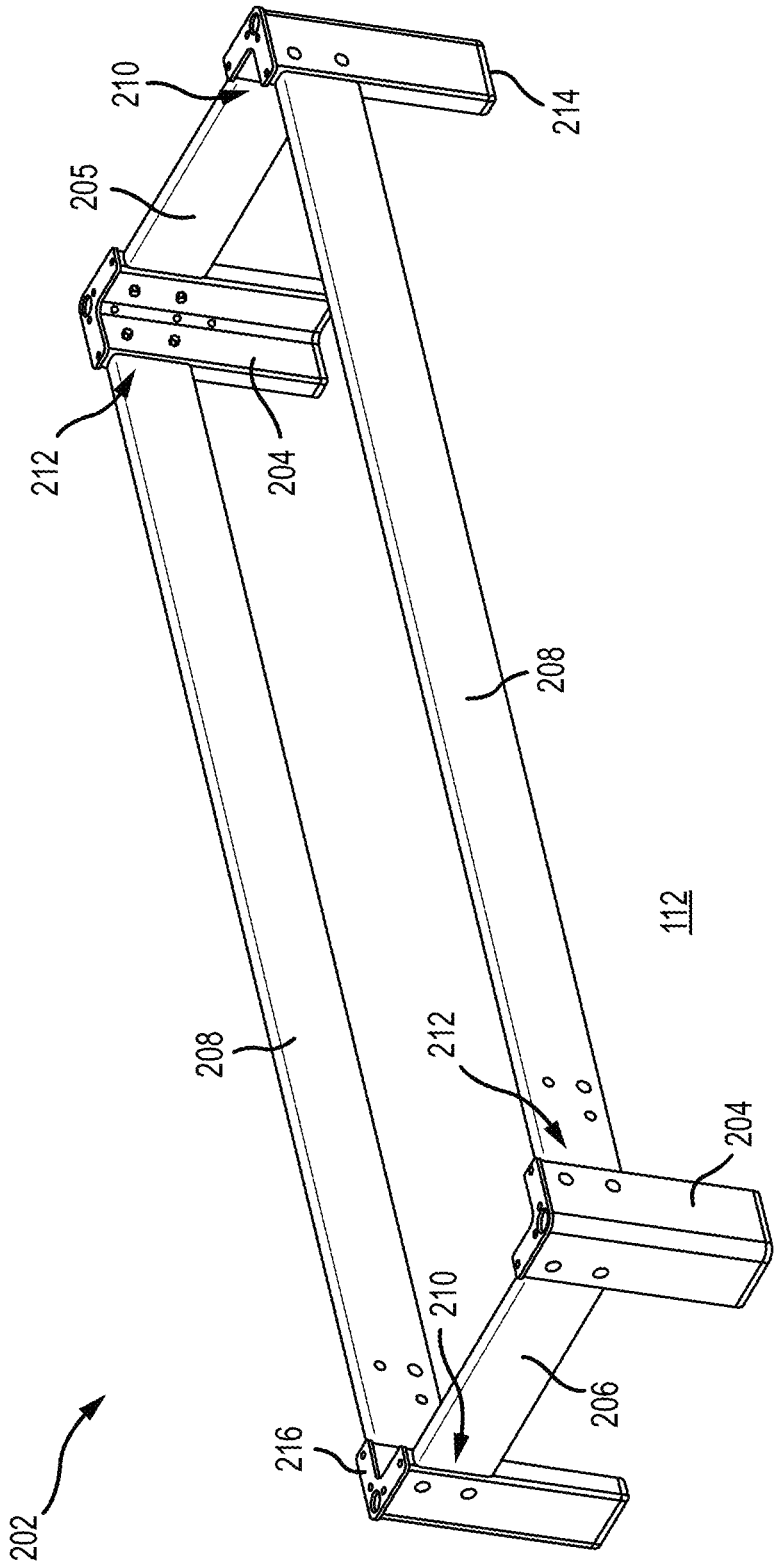
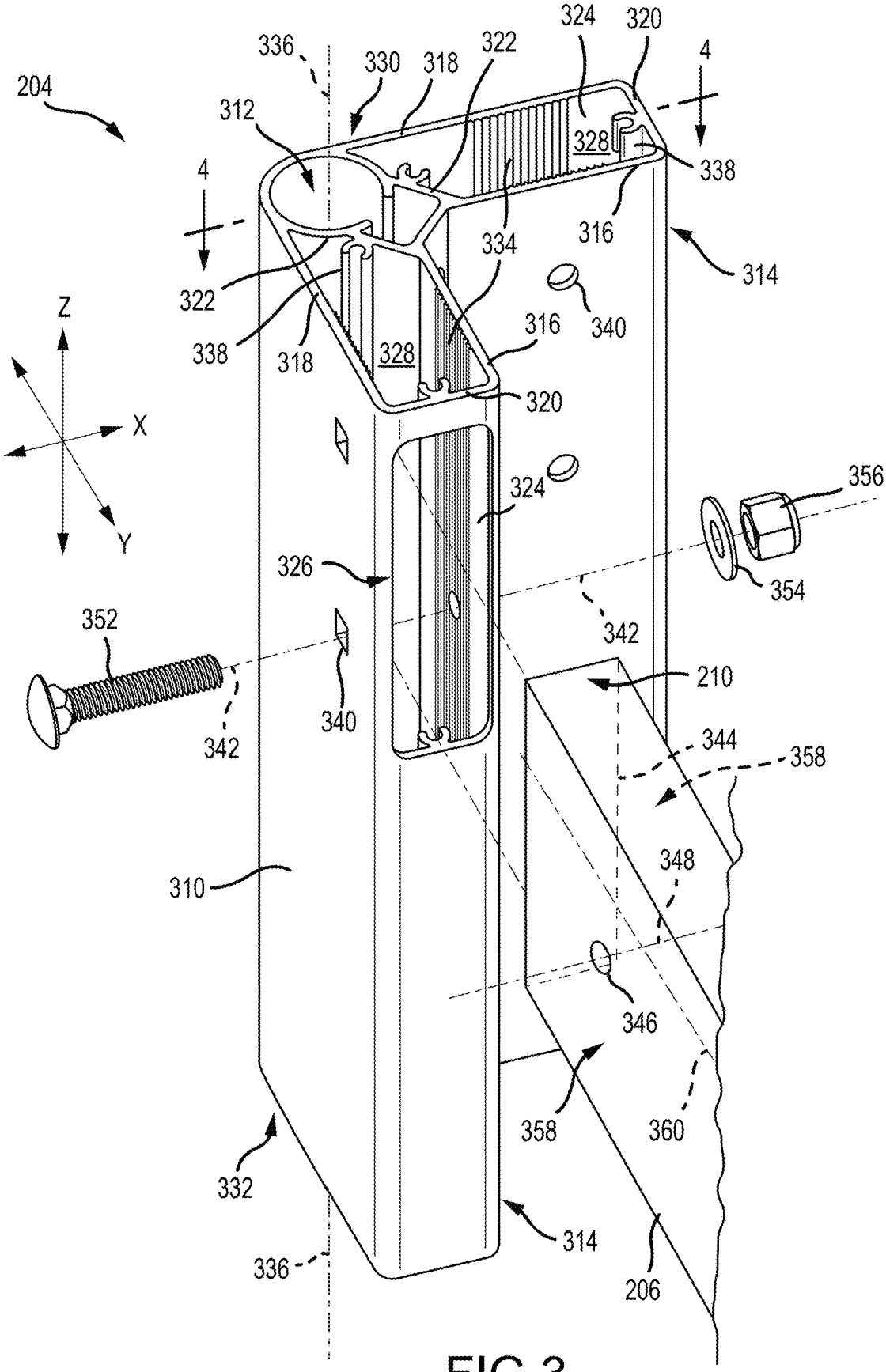


FIG.2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336
330
318
322
324
320
4
312
328
338
316
314
334
340
Z
X
Y
356
354
326
342
352
210
344
358
348
310
346
360
332
206

FIG.3

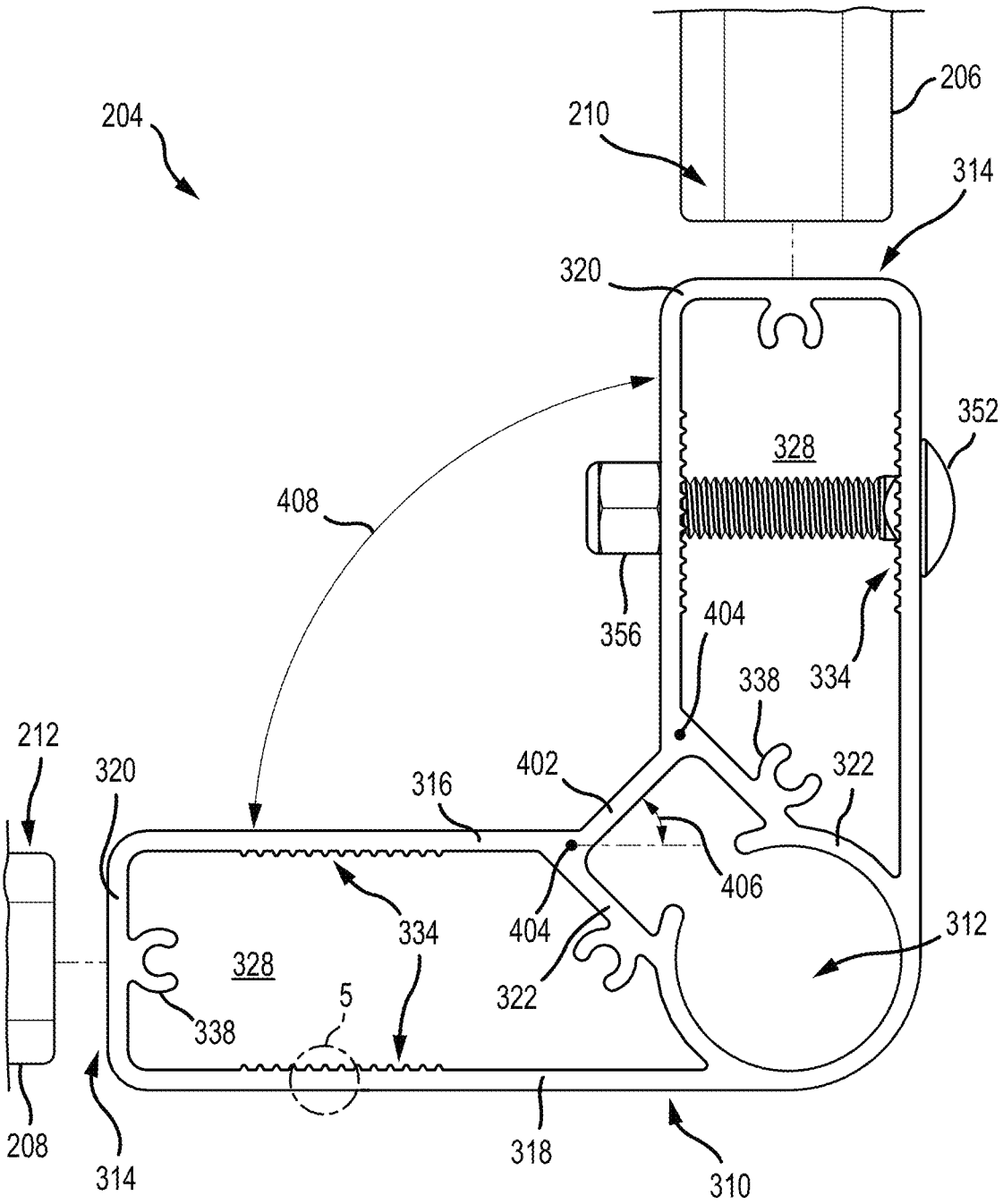
204
210
206
314
320
352
328
408
356
404
334
338
212
320
316
402
322
406
334
404
312
328
322
5
338
208
314
318
310

FIG.4

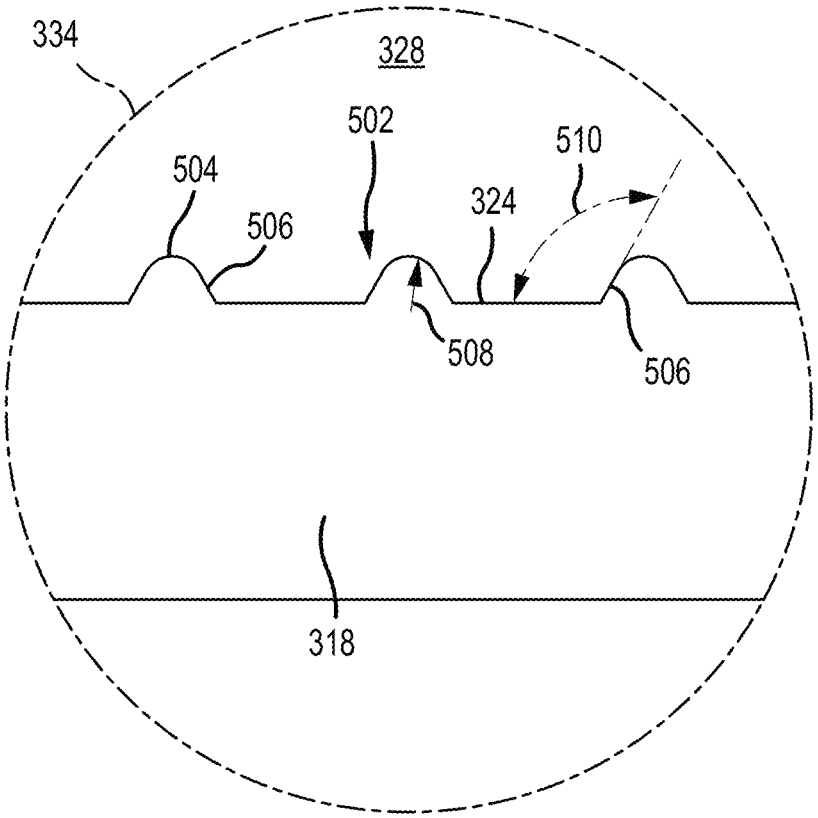

FIG.5

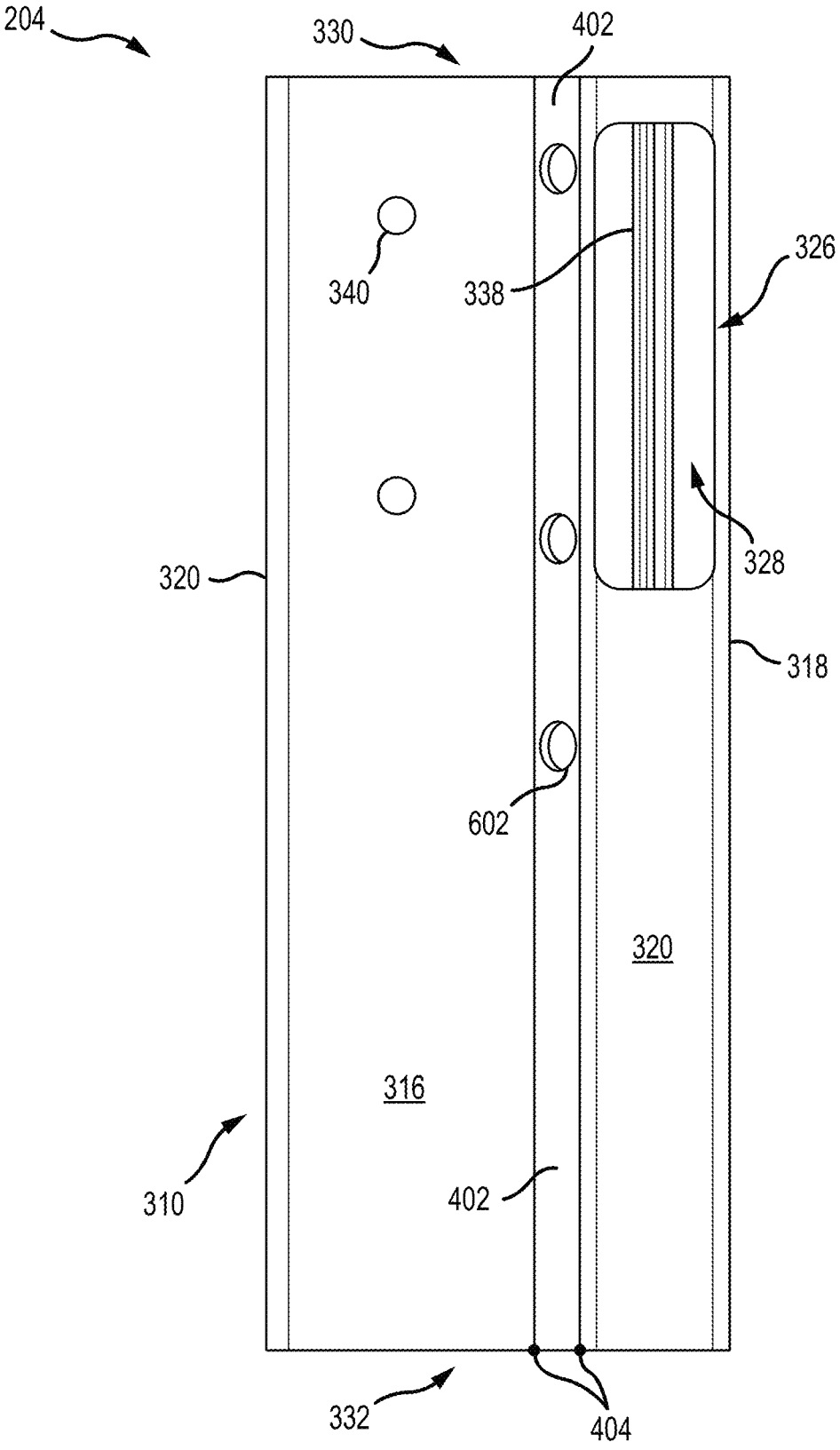

FIG.6

CORNER MEMBER FOR A SUPPORTIVE FRAME ASSEMBLY

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of priority of U.S. Provisional Patent Application Ser. No. 62/585,099, filed Nov. 13, 2017, the content of which is incorporated herein by reference in its entirety.

BACKGROUND OF THE DISCLOSURE

Field of the Disclosure

The present disclosure relates to structurally supportive frames. In particular, it relates to corner members for a physical exercise apparatus frame such as a reformer.

State of the Art

Exercise machines such as reformers utilized in the performance of physical exercises originated by Joseph Pilates include supportive frames. The frames typically include side members and end members coupled together to form a rectangular frame to support and elevate the remainder of the reformer above a surface such as a floor.

FIG. **1** is a perspective view of a known reformer exercise apparatus **100**. The reformer exercise apparatus **100** includes a rectangular frame **102** that provides structural support for various other constituent parts of the reformer exercise apparatus **100** (also referred to herein simply as a "reformer"). The frame **102** includes a head end member **104** positioned at one end of the reformer **100**. The frame **102** also includes a foot end member **106** positioned at an end of the reformer **100** that is opposite the head end member **104**. The head **104** and foot **106** end members of the frame **102** join two parallel side members **110** and typically form a leg **108** at each corner.

The reformer **100** also includes a carriage **114**. The carriage **114** is positioned between the side members **110** of the frame **102** for movement between the head **104** and foot **106** end members of the frame **102** on tracks carried by and between the side members **110**. The carriage **114** includes shoulder stops **116** and the carriage **114** accommodates the weight of a user of the reformer **100**. For example, the user of the reformer **100** may lie upon the carriage **114** with his or her feet positioned against a foot bar **118** near the foot end member **106** and his or her head positioned between the shoulder stops **116** and oriented toward the head end member **104**. Through an alternating pushing force exerted upon the foot bar **118**, the carriage **114** may be alternately moved toward and away from the foot end member **106**.

The corners of the frame **102** require relatively expensive wood joinery techniques to form solid and strong joints such that the frame **102** remains rigid and square at all times. Such techniques are generally labor intensive and expensive to implement. Therefore, a more cost effective approach to construction of a reformer frame corner structure is needed.

SUMMARY OF THE DISCLOSURE

An exemplary corner member for use in forming a frame of a reformer in accordance with the present disclosure includes an elongated hollow, tubular metal or rigid plastic extrusion having a central axis and an L shaped transverse cross section. This extrusion has a central corner portion and two leg portions extending from the central portion forming a right angle with respect to the central corner portion. The extrusion is preferably formed from a metal such as aluminum or an alloy of aluminum, although a plastic extrusion could also be used if such a plastic has sufficient rigidity characteristics.

Each leg portion includes an inner side wall spaced from an outer side wall parallel to the inner side wall. The inner side wall and the outer side wall merge with the central portion, and an outer end wall joins the inner and outer side walls of each leg portion. The inner and outer side walls each have an inner surface facing the inner surface of the other side wall, and the outer end wall includes an opening therethrough defining a space between the inner and outer side walls adjacent one end of the extrusion for receiving one end of one of the frame side members and frame end members.

At least one and preferably both of the inner surfaces of the side walls of the corner member has discrete surface features in the defined space adapted to grip and retain one end of one of the side members or end members in the space when received through the opening.

At least one and preferably both of the two leg portions of the corner member has at least one pair of holes defined through the inner and outer side walls spaced from the opening and passing through the discrete surface features. The holes receive a fastener therethrough to fasten the one end of one of the side members or end members in the space within the corner member. The surface features preferably include a plurality of ribs extending along the surface of the leg portion across the opening.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosure will be better understood and objects, other than those set forth above, will become apparent when consideration is given to the following detailed description. Such description makes reference to the accompanying drawings wherein:

FIG. **1** is a perspective view of a conventional reformer exercise apparatus;

FIG. **2** is a perspective view of a reformer frame in accordance with one embodiment of the present disclosure for a reformer exercise apparatus;

FIG. **3** is a separate exploded perspective view of one of the corner members of the frame shown in FIG. **2** in accordance with the present disclosure;

FIG. **4** is a top plan view of the corner member shown in FIG. **3** with side and end members ready for insertion into the corner member;

FIG. **5** is an enlarged partial plan view of the circled part shown in FIG. **4** of the outer side wall of the corner member to show the surface features.

FIG. **6** is a side view of the corner member shown in FIGS. **3** and **4**.

DETAILED DESCRIPTION

In the following description, numerous specific details are set forth in order to provide a more thorough disclosure. It will be apparent, however, to one skilled in the art that the art disclosed may be practiced without these specific details. In some instances, well-known features may have not been described in detail so as not to obscure the art disclosed.

FIG. **2** is a separate perspective view of a reformer frame **202** in accordance with one exemplary embodiment of the present disclosure. The frame **202** includes four corner

members **204** each having a longitudinal axis **336**. The frame **202** has a head end member **205** at one end of the frame **202** and a foot end member **206** at an opposite end of the frame **202**. The frame **202** also includes two side members **208**. Each of the head and foot end members **205** and **206** has opposite ends **210**. Similarly, each side member **208** has opposite ends **212**.

Ends **210** of the head end member **205** are each coupled to a corner member **204** in the embodiment shown in FIG. **2**. Similarly, the ends **210** of the foot end member **206** are each coupled to another corner member **204**. The head and foot end members **205** and **206** are coupled to side member ends **212** of the side members **208** by way of the corner members **204** instead of being coupled directly to one another (e.g., as they are in the conventional reformer **100** shown in FIG. **1**).

The bottom ends of the corner members **204** each contact a typically flat surface, such as a floor **112**, thereby providing structural support for and elevating the rectangular portion of the frame **202** above the floor **112**. It is to be understood however, that should the floor **112** not be level, the length of each of the corner members **204** may be selected so as to compensate, i.e., position the upper rectangular shape of the frame **202** either level or at an angle of inclination desired by a user. For purposes of this disclosure, the floor **112** is assumed to be appropriately level.

FIG. **3** is a separate exploded perspective view of a corner member **204** used in the frame **202**. FIG. **4** is a plan view of the corner member **204**. The corner member **204** is preferably an elongated, hollow, metal extrusion **310**, preferably an extrusion made of aluminum or an aluminum alloy. The metal extrusion **310** includes a central corner portion **312**. The metal extrusion **310** also includes two leg portions **314** extending from the central corner portion **312** at a right angle therebetween.

Each leg portion **314** of the metal extrusion **310** includes an inner side wall **316** and an outer side wall **318**. In the embodiment shown in FIGS. **3** and **4**, the inner side wall **316** is spaced from the outer side wall **318**. The outer side wall **318** is parallel to the inner side wall **316**. The inner side wall **316** and the outer side wall **318** merge with the corner portion **312**.

An outer part of this corner portion **312** has a circular tubular cross section such that outer side wall **318** of each leg portion **314** tangentially merges with the corner portion **312**. Each leg portion **314** of the metal extrusion **310** also includes an outer end wall **320** joining the inner side wall **316** and the outer side wall **318**. The outer end wall **320** of each leg portion **314** is positioned distal the corner portion **312**. Each of the two leg portions **314** of the metal extrusion **310** includes a corner wall **322** joining the inner side wall **316** and the outer side wall **318**. The corner wall **322** of each leg portion **314** forms an inner part of the central corner portion **312**. The corner wall **322** has a straight portion and a curved portion forming the circular tubular portion of corner portion **312**. The corner wall **322** provides additional structural support to the corner member **204** metal extrusion **310** during, for example, use and/or storage of the frame **202**.

The inner side wall **316** and the outer side wall **318** of each leg portion **314** have inner surfaces **324** facing the other side wall (**316**, **318**). The metal extrusion **310** also includes an opening **326** defined through the outer end wall **320**. The opening **326** defines a space **328** between the inner side wall **316** and the outer side wall **318** near the upper end **330** of the extrusion **310**.

As shown in FIG. **3**, at least one of the inner surfaces **324** of at least one of the two leg portions **314** includes discrete surface features **334**. In the illustrated embodiment, both of the inner surfaces **324** of both leg portions **314** include the discrete surface features **334**. The surface features **334** are preferably formed into the metal extrusion **310** integrally and contemporaneously with as part of the extrusion process used for manufacturing the corner member **204**. As such, the surface features **334** extend along the entire length (e.g., between the upper extrusion end **330** and bottom lower extrusion end **332** preferably parallel to a longitudinal axis **336** of the metal extrusion **310**. In an alternative embodiment (not shown), the surface features **334** are not integrally formed during the extrusion process, but rather may be formed in and/or placed upon at least a portion of the inner surface(s) **324** after the metal extrusion **310** is manufactured. In such other embodiments, the surface features **334** either extend along the entire length of the metal extrusion **310** inner surface(s) **324** or they are present only along a portion or along portions of that length.

The metal extrusion **310** preferably includes at least one screw race **338** typically for engaging fasteners to attach a separate cap **214**, **216** or other separate element. In the extrusion process for manufacturing the corner member **204** metal extrusion **310**, at least one screw race **338** may be formed in at least one of the corner wall **322**, the outer end wall **320**, the inner side wall **316**, the outer side wall **318**, and the corner portion **312** of at least one of the two leg portions **314**. The screw race(s) **338** may extend along the entire length of the metal extrusion **310**. The screw race(s) **338** formed in the interior of the metal extrusion **310** of the corner member **204** and are thus not externally visible when the frame **202** is assembled and caps **214** and **216** are installed.

At least one of the two leg portions **314** of the metal extrusion **310** includes at least one pair of holes **340** (preferably two pairs of holes **340**) defined through the inner and outer side walls **316** and **318**. Each of the two holes **340** of the pair of holes **340** is aligned cross-wise across the respective leg portion **314** along a transverse axis **342**. The transverse axis **342** is parallel to an x-axis and is also perpendicular to both a y-axis and a z-axis of the metal extrusion **310**, as shown in FIG. **3**. Thus, each of the two holes **340** of the pair of holes **340** is preferably positioned equidistant from both of the first and second ends **330** and **332**, as well as from the outer end wall **320** of the respective leg portion **314** through which the two holes **340** are defined.

The opening **326** in the illustrated embodiment is sized and shaped for receiving one end (**210**, **212**) of one of the side members **208** and end members (**205**, **206**) in the space **328** between the side walls **316** and **318** of the metal extrusion **310**. Preferably, the opening **326** is sized to substantially match a cross-sectional area **344** of the one end (**210**, **212**) of one of the side members **208** and end members (**205** and/or **206**). Dimensionally matching the one end (**210**, **212**) and the opening **326** in this manner facilitates a tight fit of the one end (**210**, **212**) into the metal extrusion **310** in preparation for further assembly steps of the frame **202**. The end member end(s) **210** and/or the side member end(s) **212** each preferably include a through-hole **346** predrilled through the end(s) (**210**, **212**). In the illustrated embodiment, the through-hole **346** is bored through the member (e.g., the side member **208**) along a center line **348**.

During assembly of the frame **202**, end member **210** and/or side member **212** ends are inserted into the opening(s) **326** of the metal extrusion **310** and may be butted up against wall **322**. The at least one pair of holes **340** are

adapted to receive a fastener **352** therethrough to fasten the one end (**210**, **212**) of one of the side members **208** and end members (**205**, **206**) in the space **328**. In the illustrated embodiment, the holes **340** bored through the outer side wall **318** are square-shaped to accommodate the heads of carriage bolt-type fastener(s) **352**.

The member end(s) (**210** and/or **212**) are inserted into the space(s) **328** through the opening(s) **326** to the extent that the center line(s) **348** are axially aligned with the transverse axes **342**. Next, fastener(s) **352** are inserted and received into and through the pair of holes **340** and the through-hole **346**. In the illustrated embodiment, a threaded end of the fastener **352** is first inserted into the hole **340** defined through the outer side wall **318**, the fastener **352** is inserted further into the through-hole **346**, and the threaded end of the fastener **352** exits from the hole **340** defined through the inner side wall **316**. A washer **354** is next fitted over the threaded end of the fastener **352**, and then a nut **356** is threaded onto the threaded end of the inserted fastener **352** and tightened, thus fastening and securing the member end(s) (**210** and/or **212**) inserted through the opening(s) **326** into the space(s) **328**.

The surface features **334** of the metal extrusion **310** grip and retain the end(s) (210, 212) inserted into the space(s) **328** when received through the opening(s) **326**, and when inner side wall **316** and the outer side wall **318** are squeezed together. The surface features **334** present on one or more of the inner surface(s) **324** of the leg portion(s) **314** contact with the side surfaces **358** of the end(s) (**210**, **212**) upon their being inserted into the space(s) **328** through the opening(s) **326**. Tightening of the nut **356** draws at least a portion of the inner side wall **316** and at least a portion of the outer side wall **318** toward one another, thereby applying a clamping-like distributed force against the side surfaces **358** of the end(s) (**210**, **212**) to securely retain the ends in the corner member **204**. This clamping action facilitates a close contact and/or distributed surface engagement, or bite, between the surface features **334** and the side surfaces **358** of inserted end(s) (**210**, **212**). The resulting clamped contact between the end(s) (210, 212) and the surface features **334** resists a tendency of the end(s) (**210**, **212**) to rotate under torque relative to the corner member(s) **204** in the assembled frame **202**.

Referring again to FIG. **4**, the central corner portion **312** of the metal extrusion **310** also includes an inner connecting wall **402**. In the illustrated embodiment, each of the two leg portions **314** includes an intersection point **404** between the inner side wall **316** and the corner wall **322**. The connecting wall **402** joins the two inner side walls **316** of the metal extrusion **310** and extends between the two intersection points **404** thereof. The connecting wall **402** provides additional structural support to the corner member **204** metal extrusion **310**. Also, as shown in FIG. **4**, the connecting wall **402** extends between the two intersection points **404** at an angle **406** of about forty-five degrees (45°) with respect to the inner side wall **316**.

FIG. **5** is an enlarged partial plan view of a portion of the outer side wall **318** having the surface features **334** and denoted as "5" in FIG. **4**. The exemplary surface features **334** include a plurality of longitudinal ribs **502** extending parallel to the longitudinal axis **336** along inner surface(s) **324** of the inner and outer side walls (**316**, **318**) adjacent the opening **326** through the outer end wall **320**. These ribs **502** may extend fully along the length of each of the leg portions **314** parallel to the axis **336**. These ribs **502** are formed during the process of extruding the corner member **204** metal extrusion **310**. Also, as described above in relation to FIG. **3** with respect to the surface features **334** generally, the ribs **502** extend or project into the space(s) **328** away from the inner surface(s) **324**. A distance by which the ribs **502** extend away from the inner surface(s) **324** is predetermined prior to extruding the corner member **204** metal extrusion **310**. In the illustrated embodiment, each of the plurality of ribs **502** extends away from the inner surface(s) **324** into the space(s) **328** to substantially equal distances. Alternatively, at least one of the plurality of ribs **502** may extend into the space(s) **328** to a different distance from the inner surface(s) **324** as compared to at least one other rib **502**. Each of the plurality of ribs **502** includes a tip **504**. In the illustrated exemplary embodiment, the tip **504** is rounded to a predetermined radius **508**. An arc defined by the rounded tip **504** is tangent to two rib sides **506**. In the illustrated embodiment, the two rib sides **506** of each of the plurality of ribs **502** form an angle **510** of about one-hundred-twenty degrees (120°) with respect to the inner surface(s) **324**. These ribs **502** may alternatively have a saw tooth profile rather than a symmetrical sided profile as shown.

FIG. **6** is a side view of the corner member **204** shown in FIGS. **3** and **4**. In the illustrated embodiment, the metal extrusion **310** includes one or more connecting wall holes **602** defined through the inner connecting wall **402**. The at least one connecting wall hole **602** also defines a portal through the connecting wall **402** from an exterior of the metal extrusion **310** into the interior of the metal extrusion **310**. One or more components (e.g., other than those described above with reference to the frame **202**) may be fastened to, hooked upon, inserted into and/or otherwise affixed to the connecting wall hole(s) **602** of one or more of the corner member **204** metal extrusions **310**, such as an arm cord riser (not shown) or other accessory attachment. The vertically spaced connecting wall holes **602** may be utilized to fasten an attachment such as an arm cord riser in place. In this case, the bottom hole **602** receives a screw that acts as a bottom stop for the riser tube. The upper holes may be threaded to each receive a set screw to hold the riser in place.

The above-described embodiments present only exemplary variations. Accordingly, all such alternatives, variations and modifications are intended to be encompassed within the scope or and as defined by the following claims. Referring again to FIGS. **3**-**6**, in one alternative embodiment (not shown), one or both leg portions **314** of the metal extrusion **310** does not include the corner wall **322**. In another embodiment (not shown), the opening **326** (shown in FIGS. **3** and **6**) is defined (e.g. cut) through a portion of the outer end wall **320** proximate the second extrusion end **332**, and the space **328** is thereby defined adjacent the second end **332**. In yet another embodiment (not shown), the metal extrusion **310** (shown in FIGS. **3** and **6**) includes at least two openings **326**. In such other embodiments, for example, a first opening **326** is cut through a portion of the outer end wall **320** proximate the first end **330** and a second opening **326** is cut through a portion of the outer end wall **320** proximate the second end **332**, with first and second spaces **328** thereby defined adjacent the first **330** and second **332** ends, respectively.

Although it is described herein as including a "metal" extrusion **310**, corner member **204** may be formed of a variety of materials besides, or in addition to, metals. For example, and without limitation, corner member **204** may be formed of materials of construction including plastic, wood, carbon-fiber, graphite, rock, stone, cement, and composite materials. Some of these other materials may not be amendable to extrusion-based processes and may instead require such manufacturing processes as cutting, molding, pressing,

bending, and additive manufacturing, either instead of or in addition to extrusion methods. Such alternative processes for manufacturing of the corner member **204** will be appreciated by persons having skill in the art.

In another embodiment (not shown), the cap **216** and/or base **214** piece(s) may be fastened to the first **330** and/or second **332** extrusion ends using non-threaded fastener(s) other than screws, bolts, and similar threaded fasteners. In such other embodiments, the screw race(s) **338** may not develop threads. In yet another embodiment (not shown), the holes **340** defined (e.g., bored) through the outer side wall **318** are instead circularly-shaped and the fasteners **352** are standard bolts rather than carriage bolt-type fasteners **352**. In still another embodiment (not shown), the threaded end of the fastener **352** is first inserted into the hole **340** bored through the inner side wall **316**, the fastener **352** is inserted further into the through-hole **346** toward the outer side wall **318**, and the threaded end of the fastener **352** exits from the hole **340** bored through the outer side wall **318**.

In another embodiment (not shown), the securement of the member(s) (**205**, **206**, **208**) does not make use of the washer **354**. In yet another embodiment (not shown), assembly of the frame **202** may not include use of the fastener **352** and/or the nut **356**. In such other embodiments, the surface features **334** may be sized and shaped to extend or project by a predetermined distance into the space(s) **328** such that they impinge and/or inhibit a free passage of the end(s) (**210**, **212**) into and out of the space(s) **328** through the opening(s) **326**. In such other embodiments, insertion of the end(s) (**210**, **212**) into the space(s) **328** through the opening(s) **326** may require a force to be applied (e.g., directed generally along a long axis **360** toward the corner portion **312**) during assembly of the frame **202**. Such an applied force may be required to effect movement of the ends (**210**, **212**) through the opening(s) **326** and into the space(s) **328** despite the ends (**210**, **212**) contacting the surface features **334**.

In other embodiments (not shown), the metal extrusion **310** may not include the inner connecting wall **402**. In such other embodiments, the two corner walls **322** of the metal extrusion **310** join the two inner side walls **316** at a single intersection point **404**. In still other embodiments (not shown), the connecting wall **402** extends between the two intersection points **404** at an angle with respect to the inner side wall **316** that is greater than zero degrees (0°) and less than forty-five degrees (45°) angle. In yet another embodiment (not shown), the connecting wall **402** extends between the two intersection points **404** at an angle with respect to the inner side wall **316** that is greater than 45° and less than ninety degrees (90°).

In an alternative embodiment (not shown), each of the two rib sides **506** may be oriented at right angles **510** with respect to the inner surface(s) **324**. In yet another embodiment (not shown), each of the two rib sides **506** are oriented at angles **510** with respect to the inner surface(s) **324** that are greater than 90° and less than 180°. In still other embodiments (not shown), each of the two rib sides **506** may be oriented at angles **510** with respect to the inner surface(s) **324** that are greater than 0° and less than 90°. In some embodiments (not shown), the angle **510** that a first rib side **506** makes with respect to the inner surface **324** may not be equal to the angle **510** made by a second rib side **506** with respect to the inner surface **324**. Moreover, in an alternative embodiment (not shown), the tip(s) **504** of one or more of the plurality of ribs **502** is not rounded, but rather forms a point (e.g., an apex) defined by the intersection of the two rib sides **506**. In another embodiment (not shown), the tip(s) **504** of one or more of the plurality of ribs **502** are substantially flat and thus define a plane extending along the length of the rib **502**.

The corner member **204** is formed in an L-shape with the two leg portions **314** oriented at a right angle **408**. Each of the two leg portions **314** extends away from the corner portion **312** by the same distance and the two leg portions **314** also have equivalent widths (e.g., a distance between the parallel inner **316** and outer **318** side walls). The embodiment shown in FIG. **4** is thus symmetrical along each of the x, y, and z-axes shown in FIG. **3**. In an alternative embodiment (not shown), the corner member **204** metal extrusion **310** is not symmetrically formed with respect to at least one of the x, y, and z-axes. In one such other embodiment (not shown), a first of the two leg portions **314** extends away from the corner portion **312** by a distance that is not equal to the distance by which a second of the two leg portions **314** extends away from the corner portion **312**. In another embodiment (not shown), the width of the first of the two leg portions **314** is not equal to the width of the second of the two leg portions **314**.

In another embodiment (not shown), the frame **202** (shown in FIG. **2**) is not rectangular. In these embodiments, the corner member **204** metal extrusion **310** is not L-shaped and the two leg portions **314** are not oriented with respect to one another at a right angle **408**. In one such embodiment, the two leg portions **314** are oriented at an angle **408** of greater than 0° and less than 90°. In another such embodiment, the two leg portions **314** are oriented at an angle **408** of greater than 90° and less than one-hundred-eighty degrees (180°).

One having ordinary skill in the art will appreciate that, in either of the cases where the corner member **204** is symmetrically formed with respect to each of the x, y, and z-axes, or where the corner member **204** metal extrusion **310** is not symmetrically formed with respect to at least one of the x, y, and z-axes, the general assembly steps for the frame **202**, and the principals of operation and benefits thereof remain substantially the same. Likewise, one having ordinary skill in the art will also appreciate that, in either of the cases where the frame **202** is rectangular or where the frame **202** takes on a different shape including, for example, a polygonal shape not having four sides, the assembly of, and the principals of operation and benefits of the frame **202** and its constituent parts remain substantially the same as described herein.

Manufacturers, vendors, users, and other entities benefit from the inclusion of surface features **334** on at least one of the inner surfaces **324** of at least one of the two leg portions **314** of the corner member **204** metal extrusion **310**. As compared to the known frame **102** shown in FIG. **1**, the surface features **334** facilitate longer operating lifetimes of the frame **202** by mitigating loosening of contact points between the end(s) (210, 212) and the corner member(s) **204**. In frame **202** embodiments including fastener(s) **352**, washer(s) **354** and/or nut(s) **356**, the surface features **334** also mitigate loosening of these and like fastening components during use and storage of the frame **202**. Furthermore, by reducing the tendency of the end(s) (**210**, **212**) to rotate under torque relative to the corner member(s) **204** in the assembled frame **202**, the surface features **334** facilitate reducing wear of the ends (**210**, **212**) and/or the corner member **204** metal extrusion(s) **310**. The above advantages flowing from the inclusion of surface features **334** on at least one of the inner surfaces **324** of at least one of the two leg portions **314** of the metal extrusion **310** thus provide a longer operating lifetime to the frame **202**, along with reduced

maintenance times and costs relative to the known frame **102** shown in FIG. **1**. Additional benefits of including surface features **334** on at least one of the inner surfaces **324** of at least one of the two leg portions **314** of the corner member **204** metal extrusion **310** shall be recognizable to persons of skill in the art in a multitude of applications which are not limited to the particular embodiments discussed herein.

Referring again to FIG. **2**, each of the corner members **204** of the frame **202** preferably includes an L shaped base piece **214** coupled to and/or fitted into or upon an end of the corner member **204** which contacts, for example, the floor **112**. Base piece **214** may be formed in substantially the same size and shape as a cross-sectional shape of the corner member **204**, as shown in FIG. **4**. Base piece **214** may also be formed of a material of construction that is softer, more elastic and/or more pliable than a rigid material of construction of the corner member **204**. Users of frame **202** embodiments having the base piece(s) **214** may thereby benefit by mitigating wear of the corner member(s) **204** and/or the floor **112** which may result from corner members **204** contacting the floor **112**. Users of frame **202** embodiments having the base piece(s) **214** may also benefit from being able to accommodate the frame **202** to surfaces such as the floor **112** that are not entirely flat. For example, at least one, but less than four base piece(s) **214** included in the frame **202** may have a different thickness so as to mitigate wobbling of the frame **202** placed upon an uneven floor **112** that is not entirely flat (e.g., placing the frame **202** partially upon a carpeted portion of the floor **112** and partially upon an uncarpeted portion of the floor **112**). Base pieces **214** may also have varying sizes (e.g., base piece **214** lengths relative to lengths of the corner members **204**) in embodiments of the frame **202** having corner members **204**. Users of frame **202** embodiments having base pieces **214** having varying lengths may benefit in like manner to the examples discussed above, such accommodating the frame **202** to a floor **112** that is not entirely flat.

One or more of the corner members **204** of the frame **202** may also include a cap piece **216** coupled to and/or fitted into or upon an upper end of the corner member **204** which does not contact, for example, the floor **112** (e.g., the end that is distal the floor **112**). Cap piece **216** may be formed in substantially the same size and shape as a cross-sectional shape of the corner member **204**, as shown in FIG. **4**. Cap piece **216** may also be formed of a material of construction that is softer, more elastic and/or more pliable than a material of construction of the corner member **204**. Users of frame **202** embodiments having the cap piece(s) **216** may benefit in a variety of ways. Some users may desire to store the frame **202** leaned upright against a wall (not shown) and cap piece(s) **216** may mitigate wear upon the wall for frame(s) **202** stored in this manner. For example, cap piece(s) **216** may also present a pleasing visual appearance of the frame **202** to the user. Cap piece(s) **216** having, for instance, differing colors, may also facilitate identification of two or more frames **202** by one or more users. Also, cap piece(s) **216** included in the frame **202** may prevent or mitigate discomfort or injury to the user of frame **202** by, for example, providing a rounded, softer and/or brighter color as compared to a background color (e.g., glow-in-the-dark). Such embodiments of frame **202** having cap piece(s) **216** having characteristics such of those described above facilitate users' ability to identify, locate and/or safely and comfortably enjoy the frame **202** during activities attendant to, for example, exercising on a reformer incorporating the frame **202**. The cap pieces **216** preferably may include features such as recesses or protrusions configured to engage corresponding features on the bottom pieces **214** so as to facilitate stacking of one reformer frame **202** atop another reformer frame **202**.

Manufacturers, vendors, users, and other entities benefit from the inclusion of corner members **204** in the frame **202** in a variety of tangible ways. Corner members **204** may enable more modular design and assembly methods to be employed for frames **202** as compared to known frames **102** (e.g., as included in the known reformer **100** shown in FIG. **1**). Corner members **204** included in frames **202** may also facilitate as-needed replacement and/or exchange of component parts of frame **202** with lower time and cost as compared to known frames **102**. Still more benefits shall be recognizable to persons of skill in the art in a multitude of applications which are not limited to the particular embodiments discussed herein.

One of ordinary skill in the art will recognize and appreciate that the surface features **334** may be formed in a variety of ways and in a variety of shapes and sizes beside the ribs **502** shown in FIG. **5**. For example, and without limitation, the surface features **334** may be formed as a plurality of raised bumps and/or ridges projecting away from the inner surfaces **324** into the space(s) **328**. Also, for instance, the surface features **334** may include pyramidal, polygonal, conical, frusto-conical, cylindrical, rectangular, and/or other cubic projections extending away from the inner surfaces **324** into the space(s) **328**. The corner member **204** metal extrusion **310** inner surface(s) **324** may therefore include surface features **334** including any combination of any number of one or a plurality of surface feature(s) **334** having shapes and sizes to facilitate accomplishing the several benefits as described herein, and still other benefits recognizable to one of skill in the art in a multitude of applications other than as related to particular embodiments discussed herein.

What is claimed is:

1. A reformer exercise apparatus comprising:

a rectangular frame having a head end member, a foot end member and a pair of spaced parallel side members; and

a corner member joining at least each side member to one of the head and foot end members, the corner member comprising:

a single elongated hollow metal extrusion having, in cross section, a central corner portion and two leg portions each extending from the central corner portion at a right angle to the other leg portion,

each leg portion having an inner side wall spaced from an outer side wall parallel to the inner side wall and merging with the central corner portion, and an outer end wall joining the inner and outer side walls;

the inner and outer side walls each having an inner surface facing the inner surface of the other side wall, and a rectangular opening through the outer end wall defining a space between the inner and outer side walls adjacent one end of the extrusion for receiving one end of one of the frame side members and end members;

wherein at least one of the inner surfaces of the side walls in the space has discrete rigid surface features adapted to grip and retain the one end of one of the side members and end members in the space when received through the opening; and

wherein the central corner portion has a circular cross section portion tangent to each outer side wall and a straight inner connecting wall joining the inner side wall of each leg portion.

2. The reformer exercise apparatus of claim 1, wherein at least one of the two leg portions has at least one pair of holes defined through the inner and outer side walls.

3. The reformer exercise apparatus of claim 2, wherein the at least one pair of holes are adapted to receive a fastener therethrough to fasten the one end of one of the side members and end members in the space.

4. The reformer exercise apparatus of claim 1, wherein the surface features include a plurality of ribs extending across the opening.

5. The reformer exercise apparatus of claim 1, wherein each leg portion further includes a corner wall joining the inner and outer side walls.

6. The reformer exercise apparatus of claim 5, wherein at least one of the corner wall, the outer end wall, the inner side wall, and the outer side wall includes a screw race.

7. A reformer frame having four corner members each joining a side member to one of a head end member and a foot end member, each corner member comprising:

a single elongated hollow metal extrusion having an axis and, in cross section, a central corner portion and two leg portions each extending from the central portion at a right angle to the other leg portion,

each leg portion having an inner side wall spaced from an outer side wall parallel to the inner side wall and merging with the central portion, and an outer end wall joining the inner and outer side walls;

the inner and outer side walls each having an inner surface facing the inner surface of the other side wall, and a rectangular opening through the outer end wall defining a space between the inner and outer side walls adjacent one end of the extrusion for receiving one end of one of the side members and end members;

wherein at least one of the inner surfaces of the side walls in the space has discrete rigid surface features adapted to engage the one end of one of the side members and end members in the space when received through the opening; and

wherein the central corner portion has a circular cross section portion tangent to each outer side wall and a straight inner connecting wall joining the inner side wall of each leg portion.

8. The reformer frame of claim 7, wherein at least one of the two leg portions has at least one pair of holes defined through the inner and outer side walls.

9. The reformer frame of claim 8, wherein the at least one pair of holes are adapted to receive a fastener therethrough to fasten the one end of one of the side members and end members in the space.

10. The reformer frame of claim 7, wherein the surface features include a plurality of ribs extending along the inner surface of at least one of the inner wall or the outer wall.

11. The reformer frame of claim 7, wherein each leg portion further includes a corner wall joining the inner and outer side walls.

12. The reformer frame of claim 11, wherein at least one of the corner wall, the outer end wall, the inner side wall, and the outer side wall includes a screw race.

13. The reformer frame according to claim 7 wherein the surface features are on each of the inner surfaces of the inner wall and the outer wall.

14. The reformer frame according to claim 10 wherein the ribs extend along the surface parallel to the extrusion axis.

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