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United States Patent
Corbett

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Tubular framing system and method

Abstract

A Tubular Framing System and Method. The system and method enables users to create structures from tube stock, such as carbon fiber or other composites without the need for a specialized workspace or customized tooling. The system allows the user to create joints, attachment points and mounting points for tubular and sheet composite material. When assembled, the joints between tubular segments and the attached termination fittings provide unparalleled tensile strength without the need for adhesives or special testing for verification. The system includes base assemblies, mid-span bracket and mounting assemblies and a wide range of versatile connectors that can provide the user with the flexibility to easily and rapidly create a wide variety of structures from strong and lightweight composite tube stock and aircraft-grade aluminum connectors.

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References Cited [\[Referenced By\]](#)

U.S. Patent Documents

553525	January 1896	Hankin
2926941	March 1960	Thompson
3263692	August 1966	Questi
3513610	May 1970	Devonport
3787134	January 1974	Burr
4045104	August 1977	Peterson
4093167	June 1978	Rooklyn
4116573	September 1978	Fuchs
4124317	November 1978	Dauth
4235559	November 1980	Rooklyn
4505609	March 1985	Vella
4630550	December 1986	Weitzman
4766712	August 1988	Hale
4900184	February 1990	Cleveland
4923322	May 1990	Burg
5046882	September 1991	Ju
5353892	October 1994	Lu

5383723	January 1995	Meyer
5457929	October 1995	Kim
5481842	January 1996	Gautreau
5536097	July 1996	Hazan
5556218	September 1996	Homer
5620272	April 1997	Sheng
5640811	June 1997	Boyle
5661942	September 1997	Palmer
5888015	March 1999	Brown
6219989	April 2001	Tumura
6247869	June 2001	Lichvar
6277069	August 2001	Gray
6447201	September 2002	McCracken
6503020	January 2003	Mascioletti
7682099	March 2010	Cole
8511033	August 2013	Kumakawa
9126613	September 2015	Savage
9458874	October 2016	Sim
D805883	December 2017	Evitt
D805884	December 2017	Evitt
9868008	January 2018	Todokoro
9993677	June 2018	Todokoro
2002/0090256	July 2002	Chin
2004/0226249	November 2004	Wang
2005/0008430	January 2005	Kahl
2005/0036829	February 2005	Trull
2005/0265778	December 2005	Tzeng
2006/0138066	June 2006	Hung
2007/0209314	September 2007	Vaughn
2007/0245677	October 2007	Nguyen
2007/0261356	November 2007	Vaughn
2009/0194991	August 2009	Yang
2011/0036798	February 2011	Chen
2011/0194892	August 2011	Huang
2012/0009013	January 2012	Evitt
2012/0013236	January 2012	Fan
2012/0301215	November 2012	Huang
2013/0036702	February 2013	Pacetti
2013/0156495	June 2013	Li
2013/0294817	November 2013	Augustsson
2013/0306808	November 2013	Huang
2014/0294500	October 2014	Schaaf
2015/0167713	June 2015	Schaerer
2015/0267735	September 2015	Bacon
2015/0377414	December 2015	Pirseyedi
2016/0250509	September 2016	Todokoro
2016/0363153	December 2016	Lakoduk
2017/0020282	January 2017	Bensen
2017/0030390	February 2017	Su
2017/0145708	May 2017	Chen
2017/0233995	August 2017	Abernathy
2017/0233996	August 2017	Abernathy
2017/0261022	September 2017	Schirmer
2017/0295956	October 2017	Lin
2017/0356178	December 2017	Corbett
2018/0058625	March 2018	McPhillips
2018/0064245	March 2018	Huang
2018/0066688	March 2018	Koepke
2018/0251265	September 2018	Egertz

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Parent Case Text

This application is filed within one year of, and claims priority to Provisional Application Ser. No. 62/173,306, filed Jun. 9, 2015.

Claims

What is claimed is:

1. A structural assembly, comprising: a first hollow tubular segment defined by a proximal end and a distal end; a second hollow tubular segment; and an end assembly interconnecting said first and second hollow tubular segments, said end assembly comprising: a first sleeve adapter inserted into a hollow interior of said first hollow tubular segment at said proximal end and detachably attached thereto; a second sleeve adapter inserted into a hollow interior of said second hollow tubular segment and detachably attached thereto; a block element defined by a plurality of adapter mounting bores formed therein, wherein said block element comprises: a rectangular block-shaped base defined by six faces arranged in three sets of pairs of parallel faces; a central bore formed through each of said six faces and interconnecting two said faces forming each of said three pairs of parallel faces, said central bore defining a center, a central bore vertical axis and a central bore horizontal axis; adapter mounting bores formed through each of said six faces and defining a mounting bore pattern further defining a mounting bore pattern vertical axis and a mounting bore pattern horizontal axis, whereby said mounting bore pattern vertical axis is rotationally offset from said central bore vertical axis and said mounting bore pattern horizontal axis is offset from said central bore horizontal axis by an angle θ , wherein said angle θ is less than forty five degrees; and a plurality of mounting bolts interconnecting said first and second sleeve adapters to said block element by passing through longitudinal bores formed in said sleeve adapters and threadedly engaging said adapter mounting bores.
2. The structural assembly of claim 1, further comprising: a second said end assembly connecting to said distal end of said first hollow tubular segment, said second end assembly comprising: a third sleeve adapter inserted into a hollow interior of said first hollow tubular segment and detachably attached thereto; a block element defined by a plurality of adapter mounting bores formed therein, wherein said block element comprises: a rectangular block-shaped base defined by six faces arranged in three sets of pairs of parallel faces; a central bore formed through each of said six faces and interconnecting two said faces forming each of said three pairs of parallel faces, said central bore defining a center, a central bore vertical axis and a central bore horizontal axis; adapter mounting bores formed through each of said six faces and defining a mounting bore pattern further defining a mounting bore pattern vertical axis and a mounting bore pattern horizontal axis, whereby said mounting bore pattern vertical axis is rotationally offset from said central bore vertical axis and said mounting bore pattern horizontal axis is offset from said central bore horizontal axis by an angle θ , wherein said angle θ is less than forty five degrees; and a plurality of mounting bolts interconnecting said third sleeve adapter to said block element by passing through longitudinal bores formed in said sleeve adapter and threadedly engaging said adapter mounting bores.
3. The structural assembly of claim 1, comprising: a sidewall bracket assembly attached to one of said first or second hollow tubular segments, said sidewall bracket assembly, comprising: an inner base ring defined by a peripheral outer face having bracket mounting bores formed therethrough inserted into the hollow interior of said one of said first or second tubular segments whereby said outer face is in contact with a wall of said one of said first or second tubular segments; and a corner bracket element attached to an outer surface of said one of said first or second tubular segments by a plurality of mounting bolts passing through apertures formed in said corner bracket element and said one of said first or second hollow tubular segments and threadedly engaging said bracket mounting bores.
4. The structural assembly of claim 3, comprising a flat panel attached to said corner bracket element by at least one panel mounting bolt threadedly engaging a threaded bore formed in said corner bracket element after passing through an aperture formed in said flat panel.
5. The structural assembly of claim 1, comprising: a midspan bracket assembly attached to one of said first or second hollow tubular segments, said midspan bracket assembly, comprising: an inner base ring defined by a peripheral outer face having bracket mounting bores formed therethrough inserted into said hollow interior of said one of said first or second tubular segments whereby said outer face is in contact with a wall of said one of said first or second tubular segments; and a straight bracket element attached to an outer surface of said one of said first or second tubular segments by a plurality of mounting bolts passing through apertures formed in said straight bracket element and said one of said first or second tubular segments and threadedly engaging said bracket mounting bores.
6. The structural assembly of claim 1, comprising: a midspan base assembly attached to one of said first or second hollow tubular segments, said midspan base assembly, comprising: an intermediate sleeve adapter defined by a peripheral outer face having bracket mounting bores formed therethrough inserted into the hollow interior of said one of said first or second tubular segments whereby said outer face is in contact with a wall of said one of said first or second tubular segments; and a midspan base element attached to an outer surface of said one of said first or second tubular segments by a plurality of mounting bolts passing through apertures formed in said midspan base element and said one of said first or second tubular segments and threadedly engaging said bracket mounting bores.
7. The structural assembly of claim 6, comprising a third sleeve adapter attached to said midspan base element by mounting bolts passing through bores formed in said third sleeve adapter and threadedly engaging bores formed in said midspan base element.
8. The structural assembly of claim 1, comprising: an end bracket attached to one end of one of said first or second hollow tubular segments opposing said first or second sleeve adapter, said end bracket defined by a cylindrical inner portion from which a tab portion extends, said end bracket attached to said one of said first or second tubular segments such that said cylindrical inner portion is located within said one of said first or second tubular segments and said tab portion extends out through the end thereof.
9. The structural assembly of claim 1, comprising: a double midspan bracket assembly attached to one of said first or second hollow tubular segments, said double midspan bracket assembly, comprising: an intermediate sleeve adapter defined by a peripheral outer face having bracket mounting bores formed therethrough inserted into the hollow interior of said one of said first or second tubular segments whereby said outer face is in contact with a wall of said one of said first or second tubular segments; and a pair of straight bracket elements attached to an outer surface of said one of said first or second tubular segments by a plurality of mounting bolts passing through apertures formed in said straight bracket elements and said one of said first or second tubular segments and threadedly engaging said bracket mounting bores.
10. The structural assembly of claim 1, further comprising: a third sleeve adapter attached to one of said first or second hollow tubular segments at an end opposite said end assembly; a first corner element attached to said third sleeve adapter; and a second corner element attached to said first corner element by an adjustable joint assembly interconnecting said first and second corner assemblies to one another to allow adjustable angular rotation therebetween, said adjustable joint assembly comprising: a first axle element inserted within said first corner element; a second axle element inserted within said second corner element; a spacer element inserted between said first and second corner elements; and an assembly bolt interconnecting said first axle element, said spacer element and said second axle element.
11. The structural assembly of claim 1, further comprising: a foot base assembly attached to one of said first or second hollow tubular segments, said foot base assembly, comprising: a third sleeve adapter defined by a peripheral outer face having bracket mounting bores formed therethrough inserted into the hollow interior of said one of said first or second hollow tubular segments whereby said peripheral outer face is in contact with a wall of said one of said first or second hollow tubular segments; a plurality of tube mounting bolts interconnecting said one of said first or second hollow tubular segments to said third sleeve adapter; and a foot element attached to said third sleeve adapter by a plurality of said mounting bolts passing through said foot element and threadedly engaging said third sleeve adapter.
12. The structural assembly of claim 1, wherein said angle θ is 22.5 degrees.
13. A structural assembly, comprising: a first hollow tubular segment; a second hollow tubular segment; and an end assembly interconnecting said first and second hollow tubular segments, said end assembly comprising: a first sleeve adapter inserted into a hollow interior of said first hollow tubular segment and detachably attached thereto; a second sleeve adapter inserted into a hollow interior of said second hollow tubular segment and detachably attached thereto; a block element defined by a plurality of adapter mounting bores formed therein; a plurality of mounting bolts interconnecting said first and second sleeve adapters to said block element by passing through longitudinal bores formed in said sleeve adapters and threadedly engaging said adapter mounting bores; a third sleeve adapter attached to one of said first or second hollow tubular segments at an end opposite said end assembly; a first corner element attached to said third sleeve adapter; and a second corner element attached to said first corner element by an adjustable joint assembly interconnecting said first and second corner assemblies to one another to allow adjustable angular rotation therebetween, said adjustable joint assembly comprising: a first axle element inserted within said first corner element; a second axle element inserted within said second corner element; a spacer element inserted between said first and second corner elements; and an assembly bolt interconnecting said first axle element, said spacer element and said second axle element.
14. A structural assembly, comprising: a first hollow tubular segment; a second hollow tubular segment; and an end assembly interconnecting said first and second hollow tubular segments, said end assembly comprising: a first sleeve adapter inserted into a hollow interior of said first hollow tubular segment and detachably

