

Search history

Search 1: FT=((pile* or pier* or anchor*) and (soil or ground or land)) (Results 426912)
Search 2: 1 and pd<20130905 (Results 363616)
Search 3: 2 and rail (Results 32708)
Search 4: 3 and helical (Results 2136)

Title: **HELICAL** DRIVE BICYCLE

Abstract: Source: US6199884B A bicycle with a drive mechanism using reciprocal rectilinear pedal motion to propel a pinion gear against a crown gear face associated with a rear bicycle wheel, rotating the rear wheel. The pinion gear receives motion from a **helical** member surrounded by a slider. Each pedal is united with the slider which moves linearly along a guide or track, forcing rotation of the **helical** member as the slider is pushed rearwardly by a pedal. A freewheel or overrunning clutch permits power transfer only when the pedal moves rearwardly and allows freewheeling when the pedal is reset. Reciprocal, linear pedal strokes power the bicycle.

Classifications:

International (IPC 8-9): A01K87/00 A01K89/015 A61G5/02 A63B21/00 A63B21/005 A63B21/015 A63B22/00 A63B23/035 A63B23/04 A63B24/00 B62K3/00 B62K3/10 B62M1/00 B62M1/04 B62M1/14 B62M1/16 B62M1/24 B62M17/00 B62M9/00 B63H16/18 B63H20/14 F16H25/08 F16H25/12 F16H27/02 (Advanced/Invention); A63B21/00 A63B23/035 A63B23/04 A63B24/00 (Advanced/Non-invention); A61G5/00 A63B21/005 A63B21/012 A63B22/00 B63H20/00 F16H25/00 F16H27/00 (Core/Invention); A63B21/00 A63B23/035 A63B23/04 A63B24/00 (Core/Non-invention)

International (IPC 1-7): A61G5/02 B62H1/24 B62M1/00 B62M1/04 B62M1/16 B62M23/00 B62M9/00 B63H16/00 B63H20/14 F16H25/08 F16H27/02

CPC: A63B22/0076 B63H16/14 A63B21/00069 A63B69/06

A63B21/005 A63B21/015 A63B21/072 A63B21/078 A63B23/03533 A63B23/0417 A63B22/0652 A63B2208/0233

A63B2208/0295 B62K3/005 Y10T74/1556 A63B22/0005 A61G5/042 A61G5/045 A63B22/0002 A63B22/0041

A63B2071/0018 B62M9/00 A63B24/0006 A61G5/02 A63B21/0056 A63B21/15 A63B21/157 A63B22/205 A63B22/0038

A63B2024/0009 A63B2220/13 A63B2220/12 A63B2225/30 A63B2230/06 A63B2230/42 B62M1/30 B62M1/14 B62M17/00

F16H25/12 B62K3/10 B62M1/24

European: A01K89/015 A61G5/02 A63B21/005D A63B21/015 A63B21/15 A63B21/15G A63B22/20T4 A63B23/035C4

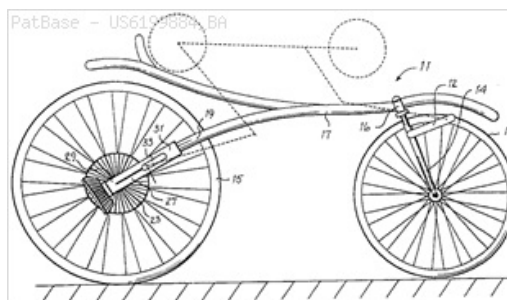
A63B24/00A1 A63B69/06 B62K3/00 B62K3/10 B62M1/14 B62M1/24 B62M1/30 B62M17/00 B62M9/00 B63H16/14 F16H25/12

K61G5/04A2 K61G5/04A6 K63B208/02E2 K63B208/02M K63B21/005 K63B21/005D K63B21/072 K63B21/078 K63B22/00A

K63B22/00A2 K63B22/00C10 K63B22/00C8 K63B22/00R K63B22/06C4R K63B22/20T4 K63B220/12 K63B220/13 K63B225/30

K63B23/04B2 K63B230/06 K63B230/42 K63B24/00A1A K63B69/06 K63B71/00H2 R16H25/12

US: 280/250.1 280/252 280/253 280/288.1 440/21 440/25 74/143



Family:

Publication number	Publication date	Application number	Application date
AU199857755 A1	19980717	AU19980057755	19971222
AU199867427 A1	19981030	AU19980067427	19980406
AU199867428 A1	19981030	AU19980067428	19980406
AU199867430 A1	19981030	AU19980067430	19980406
AU199867431 A1	19981030	AU19980067431	19980406
AU199867433 A1	19981030	AU19980067433	19980406
AU199868493 A1	19981030	AU19980068493	19980406
AU199868494 A1	19981030	AU19980068494	19980406
AU199868495 A1	19981030	AU19980068495	19980406
CA2286029 AA	19991007	CA19982286029	19980406
CA2286029 C	20061024	CA19982286029	19980406
GB2339177 A1	20000119	GB19990023677	19980406
GB2339177 B2	20011003	GB19990023677	19980406
GB9923677 A0	19991208	GB19990023677	19980406
US6199884 BA	20010313	US19960771982	19961223
US6213487 BA	20010410	US19970897618	19970721
US6241565 BA	20010605	US19970922330	19970903
WO9828182 A2	19980702	WO19971B01655	19971222
WO9828182 A3	19980903	WO19971B01655	19971222
WO9844783 A2	19981015	WO19981B00628	19980406
WO9844783 A3	19981230	WO19981B00628	19980406
WO9845163 A2	19981015	WO19981B00627	19980406
WO9845163 A3	19981217	WO19981B00627	19980406
WO9845164 A2	19981015	WO19981B00629	19980406
WO9845164 A3	19981217	WO19981B00629	19980406
WO9845165 A1	19981015	WO19981B00597	19980406
WO9845166 A1	19981015	WO19981B00605	19980406
WO9845167 A1	19981015	WO19981B00603	19980406
WO9845170 A1	19981015	WO19981B00602	19980406
WO9845621 A1	19981015	WO19981B00598	19980406

Priority:

US19960771982	19961223	US19970041924P	19970407	US19970042963P	19970407
US19970042964P	19970407	US19970043762P	19970408	US19970043762P	19970408
US19970044137P	19970416	US19970044462P	19970417	US19970044462P	19970417
US19970883341	19970626	US19970048693P	19970606	US19970049506P	19970609
US19970896416	19970718	US19970050275P	19970620	US19970049507P	19970609
US19970049509P	19970609	US19970044462P	19970417	US19970044462P	19970417
US19970045326P	19970501	US19970049102P	19970609	US19970049101P	19970609
US19970897619	19970721	WO19981B00628	19980406	WO19971B01655	19971222
US19970897618	19970721	WO19981B00603	19980406	WO19981B00605	19980406
WO19981B00597	19980406	WO19981B00602	19980406	WO19981B00598	19980406
US19970898039	19970718	US19970922330	19970903	WO19981B00629	19980406
WO19981B00627	19980406	US19970897620	19970721	US19970897155	19970718

Probable Assignee: 744353 ALBERTA LTD

Assignee(s): (std): 744353 ALBERTA LTD ; 7444353 ALBERTA LTD ; DOROFTEI ; DOROFTEI MIGHEL ; HELIXSPHERE TECHNOLOGIES INC ; HELICAL DYNAMICS INT INC ; HELICAL DYNAMICS INTERNAT INC

Assignee(s): HELICAL DYNAMICS INT ; HELICAL DYNAMICS INT INC DOROFTEI MIGHEL ; PILLSBURY MADISON AND

SUTRO LLP ; HELICAL DYNAMICS INTERNATIONAL INC

Inventor(s): (std): DOROFTEI MIGHEL ; DOROFTEL MIGHEL

Inventor(s): MIGHEL DOROFTEI

Agent(s): BORDEN LADNER GERVAIS LLP

Designated states: AL AM AT AU AZ BA BB BE BF BG BJ BR BY CA CF CG CH CI CM CN CU CY CZ DE DK EE ES FI FR GA
GB GE GH GM GN GR GW HU ID IE IL IS IT JP KE KG KP KR KZ LC LK LR LS LT LU LV MC MD MG MK ML
MN MR MW MX NE NL NO NZ PL PT RO RU SD SE SG SI SK SL SN SZ TD TG TJ TM TR TT UA UG US UZ
VN YU ZW

Title: METHODS AND APPARATUS FOR REMOVAL AND CONTROL OF MATERIAL IN LASER DRILLING OF A BOREHOLE

Abstract: Source: US2010044102A There is provided a system, apparatus and methods for removal of material for the path of a laser beam during laser drilling of a borehole and for removal of displaced borehole material from the borehole during laser drilling. In particular, there are provided paths, dynamics and parameters of fluid flows, and apparatus for obtaining such, for use in conjunction with a laser bottom hole assembly.

Classifications:

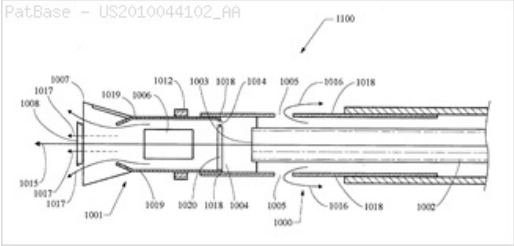
International (IPC 8-9): B01J19/12 B08B7/00 B08B9/02 B08B9/023 B08B9/027 B08B9/055 B23K26/00 B23K26/04 B23K26/06 B23K26/064 B23K26/073 B23K26/08 B23K26/10 B23K26/12 B23K26/122 B23K26/14 B23K26/16 B23K26/24 B23K26/352 B23K26/36 B23K26/38 B23K26/382 B23K26/40 B23K26/402 B23P11/00 B63B17/00 B63B35/28 B63C11/40 B63C11/44 B63C11/48 B63G8/00 B63G8/08 B65H55/00 B65H59/00 E01C23/08 E01C23/12 E02B17/00 E02D17/00 E21B10/00 E21B10/50 E21B10/54 E21B10/60 E21B17/00 E21B17/20 E21B19/00 E21B19/22 E21B21/00 E21B21/08 E21B21/10 E21B21/14 E21B21/16 E21B23/00 E21B23/14 E21B29/00 E21B29/02 E21B29/06 E21B33/00 E21B33/06

E21B33/064 E21B33/12 E21B33/13 E21B37/00 E21B4/02 E21B4/04 E21B41/00 E21B41/04 E21B43/00 E21B43/11 E21B43/114 E21B43/119 E21B43/24 E21B43/26 E21B43/267 E21B44/00 E21B47/00 E21B47/113 E21B47/12 E21B49/00 E21B7/00 E21B7/14 E21B7/15 E21B7/16 E21C35/00 E21C37/16 E21C37/18 E21C41/00 E21D9/10 F21V15/01 F21V15/06 F21V29/00 F21V8/00 G01J1/04 G01M11/00 G01M5/00 G02B6/08 G02B27/14 G02B27/20 G02B6/02 G02B6/26 G02B6/28 G02B6/32 G02B6/36 G02B6/38 G02B6/42 G02B6/44 H01J27/24 H01J40/14 H01L21/00 H01L31/00 H01S3/00 H01S3/04 H01S3/067 H01S3/08 H01S3/094 H01S3/0941 H01S3/109 H01S3/16 H01S3/30 H01S5/024 H01S5/40 H02G1/08 H04B10/079 (Advanced/Invention); B08B7/00 B23K103/00 B63B19/00 B63B21/00 B63B35/00 E02B17/00 E21B15/00 E21B23/00 E21B43/00 E21B43/116 E21B43/16 E21B49/00 E21B7/04 E21B7/15 G02B6/32 G02B6/36 G02B6/38 G02B6/42 G02B6/50 (Advanced/Non-invention); B65H55/00 E21B17/00 E21B7/00 E21B7/14 G02B6/44 (Core/Invention)

CPC: E21B4/18 E21B17/203 E21B21/12 E21B21/16 H01L31/03046 Y02E10/544 H04B10/807 H01L2924/01015 H01L2924/01047 H01L2924/00014 B63B35/28 E21C37/18 E21D9/1073 G02B6/4413 B23K26/0626 B23K37/0288 E02B2017/0095 B23K26/24 B23K26/36 G02B6/4402 E01C23/08 E21B4/02 E21C25/00 E21D9/08 E01C23/12 E21B44/00 E21B33/076 E21B36/04 E21B37/00 E21B37/08 F17D5/00 B08B9/04 B08B9/0436 B08B7/0071 B08B9/023 B08B9/027 B23K26/0093 B23K26/0648 B23K26/10 E21B4/04 E21B2023/008 H01L31/0201 H01L31/022433 H01L31/0508 H01L31/054 E02B2017/0052 E21B19/002 B08B9/02 B08B9/055 G02B6/502 G02B6/3814 B23K26/064 B23K26/142 B23K26/40 B63G2008/007 B63G8/001 E21B41/04 B23K26/1462 E01C23/127 G01M5/0025 G01M5/0033 G01M5/0091 G01M11/35 Y02E10/52 G02B6/4415 G02B6/443 G02B6/4436 G02B6/4492 B23K2203/52 E21B33/064 E21B33/063 B23K26/12 B23K26/14 B63B17/00 B63B19/00 B63B21/00 B63B35/00 E02D17/00 B08B7/0042 B23K26/0652 B23K26/127 B23K2203/10 B23K26/0732 B23K26/0736 H01S3/04 G02B6/44 E21C25/64 E21C27/24 H01S3/0675 H01S3/094003 H01S3/094042 H01S3/1608 H01S3/1616 B08B9/043 E21B43/00 E21B43/01 G21C17/017 E21B17/00 G02B6/02395 B23K26/0096 B23K26/04 B23K26/1464 E21B29/02 H01S3/0064 G02B6/4427 G02B2006/4297 E21B43/119 B23K26/00 E21B43/26 G02B6/3813 G02B6/3818 B23K26/146 B23K26/382 H01S3/0071 B23K26/16 B23K2201/04 B23K26/282 B23K26/38 B60P1/5423 B66C23/36 E21B41/00 B23K26/106 H01S5/02423 G02B23/2492 H01S3/005 G02B26/0875 G02B6/4296 E21B33/1204 E21B33/13 H01L2924/00011 B23K26/1224 B23K26/402 B23K2203/30 E21B43/162 E21B49/00 H01S3/06733 H01S3/1603 H01S3/0941 H01S3/094007 G02B6/2817 G02B6/3871 G02B6/3897 H01S3/08 G02B6/3604 E21B7/14 H01S3/302 H01S3/094046 H01S3/09415 H01S3/06708 H01S3/109 E21B29/06 E21B43/2405 B23K26/06 H01S3/094015 H01S3/094092 H01S3/094096 H01S3/1693 H01S3/1695 H01S3/2383 E21B7/15 E21B10/60 G02B6/4458 E21B21/00 E21B21/08 E21B21/103 E21B29/00 E21B43/11 E02B17/027 G02B6/3624 G02B6/4417

European: B08B7/00S2 B23K26/00M B23K26/06C B23K26/06C5 B23K26/10 B23K26/10R1 B23K26/12B B23K26/12F B23K26/14D B23K26/14N1 B23K26/38 B23K26/40B7 B63G8/00B E21B10/60 E21B17/20B E21B21/08 E21B21/12 E21B21/16 E21B4/18 E21B7/14 E21B7/15 G02B6/44C1 G02B6/44C6 G02B6/44C7A H04B10/807 L23K203/10 S02B6/42H S02B6/44C10 S02B6/44C5B S02B6/44C6 S02B6/44C7A S02B6/44C7F

US: 1/1 114/26 114/312 114/313 114/337 134/1.1 166/242.2 166/250.1 166/280.1 166/288 166/297 166/304 166/361 166/376 166/384 166/385 166/55.1 166/55.2 166/65.1 166/65.100S 166/66 166/77.1 166/77.2 175/107 175/11 175/15 175/15P 175/16 175/162 175/16P 175/16S 175/40 175/424 175/57 175/65 175/65S 175/92 175/92S 219/121.61 219/121.67 219/121.670S 219/121.7 219/121.72 219/121.720P 219/121.84 219/60R 219/61 242/159 242/159S 250/215 250/227.11 250/492.1 250/492.100P 254/134.3FT 254/134.3R 254/134.4 29/428 29/428S 299/14 299/29 359/226.2 362/259 362/317 362/553 362/553S 372/14 372/4 372/9 385/100 385/102 385/104 385/109 385/109P 385/111 385/12 385/13 385/134 385/26 385/88 385/89 385/92 385/93 385/94



Family:

Publication number	Publication date	Application number	Application date
AU2009340454 AA	20100826	AU20090340454	20090819
AU2014228980 AA	20140918	AU20140228980	20140314
BR112013001512 A2	20160607	BR20131101512	20110719
BR112013021478 A2	20161011	BR20131121478	20120223
BRPI0918403 A2	20151124	BR2009PI18403	20090819
CA2734492 AA	20100826	CA20092734492	20090819
CA2734492 C	20160517	CA20092734492	20090819
CA2805437 AA	20130114	CA20112805437	20110719
CA2805437 C	20160906	CA20112805437	20110719
CA2808214 AA	20130212	CA20112808214	20110816
CA2808214 C	20160223	CA20112808214	20110816
CA2823922 AA	20100826	CA20092823922	20090819
CA2891500 AA	20150513	CA20132891500	20131115
CA2906738 AA	20150914	CA20142906738	20140314
CN102187046 A	20110914	CN200980141304	20090819
CN102187046 B	20150429	CN200980141304	20090819
EP2315904 A1	20110504	EP20090840554	20090819
EP2315904 A4	20160420	EP20090840554	20090819
EP2399155 A1	20111228	EP20100786516	20100217
EP2399155 A4	20140709	EP20100786516	20100217
EP2596395 A2	20130529	EP20110810287	20110719
EP2596395 A4	20171227	EP20110810287	20110719
EP2606201 A1	20130626	EP20110818657	20110816
EP2611566 A1	20130710	EP20110822594	20110831
EP2611566 A4	20171108	EP20110822594	20110831
EP2664010 A2	20131120	EP20120734537	20120110

EP2678512 A1	20140101	EP20120749304	20120223	
EP2678512 A4	20170614	EP20120749304	20120223	
EP2715887 A1	20140409	EP20120793799	20120601	
EP2715887 A4	20161123	EP20120793799	20120601	
EP2739429 A2	20140611	EP20120820743	20120802	
EP2739429 A4	20161102	EP20120820743	20120802	
EP2820466 A1	20150107	EP20130754543	20130219	
EP2820466 A4	20160330	EP20130754543	20130219	
GC3576 A	20150604	GC2009P014608	20091031	
GC5934 A	20170716	GC2013P023714	20130302	
JP2012500350 T2	20120105	JP20110523959T	20090819	
JP2012518210 T2	20120809	JP20110551172T	20100217	
JP2015017498 A2	20150129	JP20140191026	20140919	
JP5684151 B2	20150311	JP20110551172T	20100217	
JP5844868 B2	20160120	JP20140191026	20140919	
MX2011001908 A1	20110620	MX20110001908	20090819	
RU2011110388 A	20120927	RU20110110388	20090819	
RU2011138270 A	20130327	RU20110138270	20100217	
RU2522016 C2	20140710	RU20110110388	20090819	
RU2551392 C2	20150520	RU20110138270	20100217	
US2010044102 AA	20100225	US20090543968	20090819	
US2010044103 AA	20100225	US20090543986	20090819	
US2010044104 AA	20100225	US20090544038	20090819	
US2010044105 AA	20100225	US20090544094	20090819	
US2010044106 AA	20100225	US20090544136	20090819	
US2010215326 AA	20100826	US20100706576	20100216	
US2012020631 AA	20120126	US20100840978	20100721	
US2012067643 AA	20120322	US20110211729	20110817	
US2012068086 AA	20120322	US20110210581	20110816	
US2012074110 AA	20120329	US20110222931	20110831	
US2012248078 AA	20121004	US20120403692	20120223	
US2012255774 AA	20121011	US20120403615	20120223	
US2012255933 AA	20121011	US20120366882	20120206	
US2012261188 AA	20121018	US20120403132	20120223	
US2012266803 AA	20121025	US20120347445	20120110	
US2012267168 AA	20121025	US20120403287	20120223	
US2012273269 AA	20121101	US20120403723	20120223	
US2012273470 AA	20121101	US20120403741	20120223	
US2012275159 AA	20121101	US20120403509	20120223	
US2013011102 AA	20130110	US20120486795	20120601	
US2013175090 AA	20130711	US20130777650	20130226	
US2013192893 AA	20130801	US20130800559	20130313	
US2013192894 AA	20130801	US20130800933	20130313	
US2013228372 AA	20130905	US20130782869	20130301	
US2013228557 AA	20130905	US20130768149	20130215	
US2013266031 AA	20131010	US20130782942	20130301	
US2013319984 AA	20131205	US20130966969	20130814	
US2014060802 AA	20140306	US20130800820	20130313	
US2014060930 AA	20140306	US20130800879	20130313	
US2014090846 AA	20140403	US20130105949	20131213	
US2014190949 AA	20140710	US20140213212	20140314	
US2014231085 AA	20140821	US20120565345	20120802	
US2014231398 AA	20140821	US20130139680	20131223	
US2014248025 AA	20140904	US20130057567	20131018	
US2015129203 AA	20150514	US20130082026	20131115	
US2015307174 AA	20151029	US20150791172	20150702	
US2015308194 AA	20151029	US20140330980	20140714	
US2015321290 AA	20151112	US20150803228	20150720	
US2015322738 AA	20151112	US20130104395	20131212	
US2016017661 AA	20160121	US20140335627	20140718	
US2016084008 AA	20160324	US20150958864	20151203	
US2016090790 AA	20160331	US20130852719	20130328	
US2016186497 AA	20160630	US20150746382	20150622	
US2016186524 AA	20160630	US20160064165	20160308	
US2016187588 AA	20160630	US20160997072	20160115	
US2016221125 AA	20160804	US20130080722	20131114	
US2016222763 AA	20160804	US20130058681	20131021	
US2016251940 AA	20160901	US20140214304	20140314	
US2016299304 AA	20161013	US20160154718	20160513	
US2016341906 AA	20161124	US20160147269	20160505	
US2017016299 AA	20170119	US20160218509	20160725	
US2017059854 AA	20170302	US20160140412	20160427	
US2017183913 A9	20170629	US20130782869	20130301	
US2017191314 AA	20170706	US20170445238	20170228	
US2017214213 AA	20170727	US20130099948	20131207	
US2017252858 AA	20170907	US20160349914	20161111	
US2017266760 AA	20170921	US20170612679	20170602	
US2017321486 AA	20171109	US20170656976	20170721	
US2018045024 AA	20180215	US20170603192	20170523	
US2018045895 AA	20180215	US20170788752	20171019	
US8424617 BB	20130423	US20090544094	20090819	

US8571488 BB	20130820	US200900546136	20090819
US8627901 BA	20140114	US20100896021	20101001
US8636085 BB	20140128	US20090543968	20090819
US8662160 BB	20140304	US20110210581	20110816
US8701794 BB	20140422	US20130800559	20130313
US8757292 BB	20140624	US20130800933	20130313
US8820434 BB	20140902	US20090544038	20090819
US8826973 BB	20140909	US20090543986	20090819
US8869914 BB	20141028	US20130800820	20130313
US8879876 BB	20141104	US20130057567	20131018
US8936108 BB	20150120	US20130800879	20130313
US8997894 BB	20150407	US20130777650	20130226
US9027668 BB	20150512	US20120403692	20120223
US9074422 BB	20150707	US20120403287	20120223
US9080425 BB	20150714	US20120347445	20120110
US9089928 BB	20150728	US20120565345	20120802
US9138786 BB	20150922	US20120366882	20120206
US9242309 BB	20160126	US20130768149	20130215
US9244235 BB	20160126	US20130782942	20130301
US9267330 BB	20160223	US20120403723	20120223
US9284783 BA	20160315	US20130852719	20130328
US9327810 BB	20160503	US20150791172	20150702
US9347271 BB	20160524	US20100706576	20100216
US9360631 BB	20160607	US20120403509	20120223
US9360643 BB	20160607	US20120486795	20120601
US9399269 BB	20160726	US20140213212	20140314
US9492885 BB	20161115	US20150803228	20150720
US9512679 BB	20161206	US20130104395	20131212
US9534447 BB	20170103	US20140335627	20140718
US9545692 BB	20170117	US20130080722	20131114
US9562395 BB	20170207	US20120403615	20120223
US9664012 BB	20170530	US20130105949	20131213
US9669492 BB	20170606	US20130966969	20130814
US9719302 BB	20170801	US20130782869	20130301
US9784037 BB	20171010	US20150746382	20150622
WO10096086 A1	20100826	WO2009US54295	20090819
WO10144160 A1	20101216	WO2010US24368	20100217
WO12012436 A2	20120126	WO2011US44548	20110719
WO12012436 A3	20120315	WO2011US44548	20110719
WO12024285 A1	20120223	WO2011US47902	20110816
WO12031009 A1	20120308	WO2011US50044	20110831
WO12096966 A2	20120719	WO2012US20789	20120110
WO12096966 A3	20121004	WO2012US20789	20120110
WO12116148 A1	20120830	WO2012US26265	20120223
WO12116153 A1	20120830	WO2012US26277	20120223
WO12116155 A1	20120830	WO2012US26280	20120223
WO12167102 A1	20121206	WO2012US40490	20120601
WO13019959 A2	20130207	WO2012US49338	20120802
WO13019959 A3	20130328	WO2012US49338	20120802
WO13130302 A1	20130906	WO2013US26673	20130219
WO14078663 A2	20140522	WO2013US70321	20131115
WO14078663 A3	20140821	WO2013US70321	20131115
WO14144591 A2	20140918	WO2014US29067	20140314
WO14144591 A3	20141211	WO2014US29067	20140314
WO14144887 A2	20140918	WO2014US29482	20140314
WO14144887 A3	20141204	WO2014US29482	20140314
WO14149114 A2	20140925	WO2013US77614	20131223
WO14149114 A3	20150115	WO2013US77614	20131223

Priority:

CA20092734492	20090819	CA20092823922	20090819	US20080090384P	20080820
US20080102730P	20081003	JP20110523959	20090819	JP20110523959T	20090819
US20080106472P	20081017	US20090153271P	20090217	US20090543968	20090819
US20090543986	20090819	US20090544038	20090819	US20090544094	20090819
US20090247796P	20091001	US20090320581	20090129	US20090544136	20090819
US20100295562P	20100115	US20100706576	20100216	US20100840978	20100721
US20100374594P	20100817	US20100378910P	20100831	US20110211729	20110817
US20110210581	20110816	US20110222931	20110831	US20110431827P	20110111
US20110431830P	20110207	US20100896021	20101001	US20110034037	20110224
US20110034183	20110224	US20110034017	20110224	US20110034175	20110224
US20110446042P	20110224	US20110446043P	20110224	US20110446312P	20110224
US20110439970P	20110207	US20110514391P	20110802	US20110446040P	20110224
US20110446041P	20110224	US20110446412P	20110224	US20110446407P	20110224
US20120403692	20120223	US20120403615	20120223	US20120366882	20120206
US20120403132	20120223	US20120347445	20120110	US20120403287	20120223
US20110446047P	20110224	US20120403723	20120223	US20120403741	20120223
US20120403509	20120223	US20120605429P	20120301	US20120605434P	20120301
US20120605422P	20120301	US20120605413P	20120301	US20110493174P	20110603
US20120486795	20120601	US20120727096P	20121115	US20120565345	20120802
US20120745661P	20121224	US20130057567	20131018	US20120734809P	20121207
US20130015003	20130830	US20120605401P	20120301	WO2009US54295	20090819
WO2010US24368	20100217	WO2011US44548	20110719	WO2011US47902	20110816
WO2011US50044	20110831	US20130777650	20130226	US20130800559	20130313
US20130800933	20130313	US20130782869	20130301	US20130768149	20130215
US20130755745P	20130123	WO2012US20789	20120110	US20130966969	20130814
WO2012US26265	20120223	US20130800820	20130313	US20130800879	20130313

US20130795879P 20130313	WO2012US49498 20120601	US20120785587P 20120315
US20130139680 20131223	US20130786875P 20130315	US20130080722 20131114
US20130082026 20131115	US20130786763P 20130315	US20130099948 20131207
WO2013US26673 20130219	WO2013US70321 20131115	WO2014US29067 20140314
US20150791172 20150702	US20140330980 20140714	US20150803228 20150720
US20130104395 20131212	US20140335627 20140718	US20130852719 20130328
US20150958864 20151203	US20140214304 20140314	US20150746382 20150622
US20160064165 20160308	US20140270288 20140505	US20150266509P 20151211
US20130058681 20131021	US20160154718 20160513	US20160147269 20160505
US20160218509 20160725	US20150262870P 20151203	US20160140412 20160427
US20170445238 20170228	US20160997072 20160115	US20130782942 20130301
US20160349914 20161111	US20170612679 20170602	US20170656976 20170721
US20130768149P 20130215	US20170603192 20170523	US20170788752 20171019
US20160410724P 20161020		

Probable Assignee: FORO ENERGY INC

Assignee(s): (std): MOXLEY JOEL F ; LAND MARK S ; KOBlick YESHAYA ; GRUBB DARYL L ; GRAY WILLIAM C ; MCKAY RYAN P ; KOLACHALAM SHARATH K ; MAKKI SIAMAK ; JONES ALBERTUS REBECCA ; FRAZE JASON D ; FORO ENERGY INC ; LINYAEV EUGENE J ; MARSHALL SCOTT A ; MESNARD DAVID R ; HAVLINEK KENNETH L ; KOLACHALAM SHARARTH ; FAIRCLOTH BRIAN O ; FAIRCLOTH BRAIN O ; DEWITT RON A ; DEWITT RONALD A ; FORD ENERGY INC ; FAIRDOTH BRIAN O ; FORO EHNERDZHI INK ; LINYAEV EUGENCE J ; KOLACHALAM SHARARTH K ; NEHLSen JAMES P ; RINZLER CHARLES C ; ZEDIKER MARK S ; UNDERWOOD LANCE D ; SCHROIT SAM N ; NORTON RYAN J ; VOLKMAR JOHN F ; ALLEN ERIK C ; CHEVRON USA INC ; DE WITT RONALD A ; DEUTCH PAUL D

Assignee(s): DEUTSCH PAUL D ; YEARWOOD JOHN ; ZIMMERMAN TOM ; ELY JOHN L ; ENERGY UNITED STATES DEPARTMENT OF ; KELLERMANN FRED C

Inventor(s): (std): DEWITT RON A ; FAIRCLOTH BRAIN O ; FAIRCLOTH BRIAN O ; FAIRDOTH BRIAN O ; FEHRKLOT BRAJAN O ; GRUBB DARYL L ; JOEL F MOXLEY ; KOBlick YESHAYA ; KOBLIK JESHAJA ; KOLACHALAM SHARARTH K ; LAND MARK S ; LEHND MARK S ; LINYAEV EUGENCE J ; MARK S LAND ; MARK S ZEDIKER ; MCKAY RYAN P ; MESNARD DAVID R ; MOKSLI DZHOEL F ; MOXLEY JOEL F ; NORTON RYAN J ; RINZLER CHARL Z K ; RINZLER CHARLES C ; SCHROIT SAM N ; BRIAN O FAIRCLOTH ; CHARLES C RINZLER ; UNDERWOOD LANCE D ; ZEDIKER MARK S ; GRAY WILLIAM C ; DEWITT RONALD A ; ALLEN ERIK C ; ZIMMERMAN TOM ; YESHAYA KOBlick ; YEARWOOD JOHN ; VOLKMAR JOHN F ; NEHLSen JAMES P ; MARSHALL SCOTT A ; MAKKI SIAMAK ; LINYAEV EUGENE J ; KOLACHALAM SHARATH K ; KOLACHALAM SHARARTH ; KELLERMANN FRED C ; JONES ALBERTUS REBECCA ; HAVLINEK KENNETH L ; GRUBB DARYL ; FRAZE JASON D ; DEUTCH PAUL D ; ELY JOHN L ; ELY JOHN ; DE WITT RONALD A

Inventor(s): DARYL L GRUBB ; ERIK C ALLEN ; LEE IAN ; KUZNETSOV ANDREY ; DEUTSCH PAUL D ; CHARLES CRINZLER ; BRIAN OFAIRCLOTH ; SHARATH K KOLACHALAM ; MARK SZEDIKER ; JOEL FMOXLEY

Agent(s): SPRUSON AND FERGUSON; CASSAN MACLEAN; CASSAN MACLEAN IP AGENCY INC; BUNGARTZ KLAUS PETER; TERSTEEGEN FELIX; SABA AND CO TMP; SAUD M A SHAWWAF LAW OFFICE; ITOH SHIGERU; BRINKS HOFER GILSON AND LIONE; FORO ENERGY/BHGL; FORO ENERGY BHGL; GLEN; GLEN P; STEPTOE AND JOHNSON LLP; STEPTOE AND JOHNSON; BRIAN; STEPTOE AND JOHNSON LLC; BELVIS LAW LLC; BELVIS GLEN P; FREEMAN JOHN C; BELVIS GLEN P ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: METHOD AND APPARATUS FOR FORMING AND MOUNTING A PHOTOVOLTAIC ARRAY

Abstract: Source: US2010065108A A photovoltaic (PV) module framing and coupling system enables the attachment of PV modules to a roof or other mounting surface without requiring the use of separate structural support members which attach directly to and span between multiple PV modules in a formed PV array. The inventive apparatus provides a one-piece coupling for interlocking the sides of PV modules together to form an array, resulting in a parallel beam support system. The inventive coupling member attaches to the frame at substantially any position along the length of the frame, and interlocks the photovoltaic module with adjacent photovoltaic modules. The inventive apparatus further includes a novel bracket member which attaches to a surface of the frame member and secures the frame member directly to a roof or other mounting surface.

Classifications:

International (IPC 8-9): E04B1/00 E04D1/12 E04D13/18 E04G21/00 E04H14/00 F16B1/00 F16B17/00 F16B5/00 F16B5/02 F16B5/10 F16B5/12 F16D1/12 F16L3/04 F16L3/10 F16M13/00 F16M13/02 F24J2/52 H01L H01L23/12 H01L31/02 H01L31/0203 H01L31/04 H01L31/042 H01L31/046 H01L31/048 H01L31/05 H01L31/18 H01M10/44 H01R13/73 H02G3/32 H02S20/00 H02S20/10 H02S20/23 H02S20/24 H02S20/30 H02S30/10 H02S40/30 (Advanced/Invention); F24J2/46 (Advanced/Non-invention); E04G21/00 F24J2/00 H01L31/042 H01L31/048 H01M10/42 (Core/Invention); H01L (Subclass/Invention)

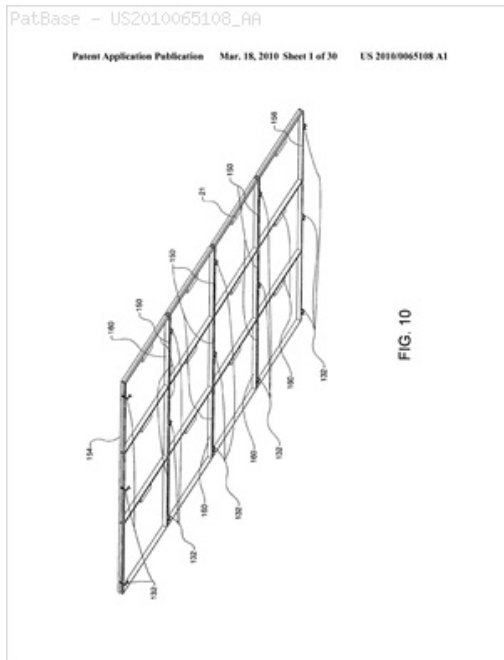
International (IPC 1-7): H01M10/44

CPC: F24J2/523 F24J2002/4665 F16B7/0433 H02S20/30 F16B5/10 F24J2002/4669 H01L31/0482 H01L31/0484 F24J2002/5292 F16B5/12 H01L31/048 H01L31/0488 Y10T403/44 F16B1/00 E04D1/12 F16M13/022 F24J2/5256 H02S40/30 H01L31/18 Y10T403/553 F16B5/0004 F24J2/525 F16B5/0216 H02G3/32 H01R9/2416 H01L31/0508 H01L31/046 H02S30/00 Y10T403/32606 Y10T403/70 Y02E10/50 Y02B10/20 H01L31/0424 F24J2/5211 F24J2/5245 F24J2/5262 F24J2002/4672 H02S20/24 H01L31/042 H01L31/0422 F16L3/04 F16L3/1058 H02S20/20 Y10T29/49876 F24J2/5239 H02S30/10 F24J2/5264 F24J2/5205 F24J2/5247 F24J2/5254 F24J2/5258 F24J2/526 F24J2002/5215 F24J2002/5226 H02S20/23 Y02B10/12 Y02E10/47 H02S20/00 Y10T29/49826 Y10T403/32975 Y10T403/38 F24J2002/522

European: F24J2/52A20B F24J2/52A20B4 F24J2/52A20C2 F24J2/52A20C4B F24J2/52A20D F24J2/52A20E F24J2/52A30 F24J2/52A4E F24J2/52A8 F24J2/52A8F H01L31/042B H01L31/048B H01L31/048B3 R16B7/04C R24J2/46P12 R24J2/46P16 Y02B10/12 Y02B10/20 Y02E10/47 Y02E10/50

US: 1/1 126/623 136/244 136/251 136/252 136/259 211/41.1 24/531 248/188.4 248/201 248/205.1 248/222.11 248/222.41 248/231.81 248/309.1 248/316.7 248/346.04 248/346.05 248/617 248/74.2 29/428 29/453 29/825 361/679.01 403/119 403/164 403/164S 403/186 403/186S 403/217 403/294 403/345 52/173.3 52/555 52/582.2 52/586.2 52/745.21 52/745.210S 52/747.1 D8/349

Locarno class: 08/08



Family:

Publication number	Publication date	Application number	Application date
AU2010286953 AA	20110303	AU20100286953	20100702
AU2010286953 BB	20150507	AU20100286953	20100702
CA2820935 AA	20130607	CA20112820935	20111209
CN103081119 A	20130501	CN201080036846	20100702
CN103081119 B	20160615	CN201080036846	20100702
CN104247039 A	20141224	CN201080037446	20100702
CN104247039 B	20170405	CN201080037446	20100702
CN205666580 U	20161026	CN201490000566U	20140228
EP2135321 A1	20091223	EP20080742673	20080408
EP2135321 A4	20101013	EP20080742673	20080408
EP2135321 B1	20170802	EP20080742673	20080408
EP2449596 A2	20120509	EP20100730338	20100702
EP2449598 A2	20120509	EP20100735370	20100702
EP2449599 A2	20120509	EP20100747093	20100702
IL226835 A0	20130829	IL20110226835	20111209
IN00884CN2012 A	20130405	IN2012CN00884	20120127
IN06542CN2009 A	20100305	IN2009CN06542	20091106
JP2011512016 T2	20110414	JP20100502161T	20080408
JP2014055506 A2	20140327	JP20130241924	20131122
JP2014057099 A2	20140327	JP20130241925	20131122
JP2016026275 A2	20160212	JP20150215833	20151102
JP5421898 B2	20140219	JP20100502161T	20080408
JP5722982 B2	20150527	JP20130241925	20131122
JP5845521 B2	20160120	JP20130241924	20131122
JP6159377 B2	20170705	JP20150215833	20151102
KR101467600 B1	20141205	KR20097023015	20080408
KR101743160 B1	20170602	KR20127002984	20100702
KR20100103340 A	20100927	KR20097023015	20080408
KR20120098589 A	20120905	KR20127002984	20100702
US2010065108 AA	20100318	US20080594935	20080408
US2011000519 AA	20110106	US20100830250	20100702
US2011000520 AA	20110106	US20100830252	20100702
US2011000526 AA	20110106	US20100830249	20100702
US2011000544 AA	20110106	US20100830257	20100702
US2012125410 AA	20120524	US20120351397	20120117
US2012152326 AA	20120621	US20110325054	20111213

US2012234378 AA	20120920	US20110316453	20111209
US2012255598 AA	20121011	US20120415669	20120308
US2012260972 AA	20121018	US20120421797	20120315
US2012266946 AA	20121025	US20120402860	20120222
US2012279558 AA	20121108	US20120410149	20120301
US2012298186 AA	20121129	US20120405118	20120224
US2012298188 AA	20121129	US20120434426	20120329
US2013140416 AA	20130606	US20120491436	20120607
US2013180572 AA	20130718	US20120407607	20120228
US2013180573 AA	20130718	US20120413329	20120306
US2013180574 AA	20130718	US20120434420	20120329
US2013183084 AA	20130718	US20120489680	20120606
US2014026946 AA	20140130	US20130911955	20130606
US2014053891 AA	20140227	US20130961662	20130807
US2014102997 AA	20140417	US20130106189	20131213
US2014175244 AA	20140626	US20130106153	20131213
US2014182662 AA	20140703	US20130961723	20130807
US2014251431 AA	20140911	US20140278615	20140515
US2014326838 AA	20141106	US20140194607	20140228
US2014339179 AA	20141120	US20140451781	20140805
US2015033658 AA	20150205	US20140519407	20141021
US2015040967 AA	20150212	US20140454471	20140807
US2015068590 AA	20150312	US20140541469	20141114
US2015075590 AA	20150319	US20140531155	20141103
US2015155820 AA	20150604	US20150617239	20150209
US2015155821 AA	20150604	US20150618302	20150210
US2015155823 AA	20150604	US20150615320	20150205
US2015222221 AA	20150806	US20150617143	20150209
US2015222222 AA	20150806	US20150625216	20150218
US2015316292 AA	20151105	US20150704701	20150505
US2016043690 AA	20160211	US20150886184	20151019
US2016043691 AA	20160211	US20150880789	20151012
US2017104118 A9	20170413	US20130961662	20130807
US2017222599 AA	20170803	US20170431620	20170213
US8109048 BB	20120207	US20080594935	20080408
US8375654 BA	20130219	US20120370612	20120210
US8919052 BB	20141230	US20100830249	20100702
US8919053 BB	20141230	US20100830252	20100702
US8991114 BB	20150331	US20100830250	20100702
US9154074 BB	20151006	US20140519407	20141021
US9166524 BB	20151020	US20150615320	20150205
US9243817 BB	20160126	US20120489680	20120606
US9300244 BB	20160329	US20140541469	20141114
US9447801 BB	20160920	US20120405118	20120224
US9461579 BB	20161004	US20150880789	20151012
US9496821 BB	20161115	US20140278615	20140515
US9518596 BB	20161213	US20140454471	20140807
US9574588 BB	20170221	US20120410149	20120301
US9647157 BB	20170509	US20130911955	20130606
US9698724 BB	20170704	US20130106153	20131213
US9816731 BB	20171114	US20110316453	20111209
US9831818 BB	20171128	US20150704701	20150505
US9853597 BB	20171226	US20150618302	20150210
US9863665 BB	20180109	US20120402860	20120222
USD779308 S1	20170221	US20150525417F	20150429
USD803664 S1	20171128	US20170592828F	20170202
WO08124158 A1	20081016	WO2008US04569	20080408
WO11019460 A2	20110217	WO2010US40984	20100702
WO11019460 A3	20110818	WO2010US40984	20100702
WO11022125 A2	20110224	WO2010US40986	20100702
WO11022125 A3	20110901	WO2010US40986	20100702
WO11025585 A2	20110303	WO2010US40981	20100702
WO11025585 A3	20110901	WO2010US40981	20100702
WO12079060 A2	20120614	WO2011US64291	20111209
WO12079060 A3	20140410	WO2011US64291	20111209
WO12082806 A2	20120621	WO2011US64749	20111213
WO12082806 A3	20140410	WO2011US64749	20111213
WO14134580 A1	20140904	WO2014US19697	20140228
ZA201305062 A	20140730	ZA20130005062	20130705

Priority:

JP20100502161	20080408	JP20100502161T	20080408	US20070922180P	20070406
US20080065417	20080211	JP20130241924	20080408	JP20150215833	20151102
US20080065417P	20080211	US20080066001P	20080215	US20080066001	20080215
US20080594935	20080408	US20090270122P	20090702	US20090594935	20091006
US20090255004P	20091026	US20100351586P	20100604	US20110511295P	20110725
US20100421621P	20101209	US20100422429P	20101213	US20110445044P	20110222
US20110325054	20111213	US20120402860	20120222	US20100830249	20100702
US20100830250	20100702	US20120351397	20120117	US20100830252	20100702
US20100830257	20100702	US20110316453	20111209	US20120405118	20120224
US20110494208P	20110607	US20120370612	20120210	US20120407607	20120228
US20130911955	20130606	US20120656240P	20120606	US20130827219P	20130524
US20130106153	20131213	US20120737066P	20121213	US20140531155	20141103
US20150617239	20150209	US20150618302	20150210	US20150617143	20150209

US20140541469	20141114	US20120489680	20120606	US20130771050P	20130228
US20130961723	20130807	US20130961662	20130807	US20140278615	20140515
US20140519407	20141021	US20150615320	20150205	US20120415669	20120308
US20120421797	20120315	US20120410149	20120301	US20120434426	20120329
US20120491436	20120607	US20130106189	20131213	US20120737076P	20121213
US20120434420	20120329	US20120413329	20120306	US20140454471	20140807
US20130866152P	20130815	US20150525417F	20150429	US20140451781	20140805
US20130864637P	20130812	US20140194607	20140228	WO2008US04569	20080408
WO2010US40986	20100702	WO2010US40981	20100702	US20150625216	20150218
US20150880789	20151012	WO2011US64291	20111209	WO2010US40984	20100702
WO2014US19697	20140228	US20150886184	20151019	US20150704701	20150505
US20170431620	20170213	US20170592828F	20170202		

Probable Assignee: SOLARCITY CORP

Assignee(s): (std): ALCHLEY BRIAN ; ATCHLEY BRIAN ; CHRISTINA C MANANSALA ; COLEMAN NATHANIEL TAYLOR ; GRUBER PETER EDWARD ; HAENLEIN HANS CHRISTOPH ; MANANSALA CHRISTINA C ; JOHN R WEST ; HANS CHRISTOPH HAENLEIN ; HAENLEIN HANS CHRISTOPHER ; HAENLEIN HANS CRISTOPH ; JOHANSEN EMIL ; HUDSON TYRUS HAWKES ; HUDSON TYRUS ; WEST JOHN R ; ZEP SOLAR INC ; ZAP SOLAR INC ; ZEP SOLAR LLC ; SOLARCITY CORP ; MANSALA CHRISTAIN C ; WEST JOHN RAYMOND ; WEST BRIAN ; YOUMANS DAVID ; ZEP SOAR INC ; WEST JACK RAYMOND

Assignee(s): MANANSALA CHRISTINA C ; HAENLEIN HANS CHRISTOPH ; HIGH SUN TECHNOLOGY INC

Inventor(s): (std): YOUMANS DAVID ; WEST JOHN RAYMOND ; WEST JOHN R ; WEST JACK RAYMOND ; WEST BRIAN ; MANANSALA CHRISTINA C ; JOHN R WEST ; JOHANSEN EMIL ; HUDSON TYRUS HAWKES ; HUDSON TYRUS ; HANS CHRISTOPH HAENLEIN ; HAENLEIN HANS CRISTOPH ; HAENLEIN HANS CHRISTOPH ; GRUBER PETER EDWARD ; COLEMAN NATHANIEL TAYLOR ; COLEMAN NATHANIEL ; CHRISTINA C MANANSALA ; ATCHLEY BRIAN ; ALCHLEY BRIAN ; MANSALA CHRISTAIN C ; HAENLEIN HANS CHRISTOPHER ; BRIAN WEST

Inventor(s): MANANSALA CHRISTINA ; WEST JOHN ; JOHN RWEST

Agent(s): CHRISTIANSEN JOHN; JOHN CHRISTIANSEN; FREEHILLS PATENT ATTORNEYS; FPA PATENT ATTORNEYS PTY LTD; MARKS AND CLERK; GOWLING WLG CANADA LLP; CHAILLOT GENEVIEVE; HOWSON RICHARD GB; INABA YOSHIYUKI; LARRY D JOHNSON; VIERRA MAGEN MARCUS AND DENIRO LLP; LARRY D; KILPATRICK TOWNSEND AND STOCKON LLP; KILPATRICK TOWNSEND AND STOCKTON LLP; KILPATRICK TOSENSEND AND STOCKTON LLP; STERNE KESSLER GOLDSTEIN AND FOX PLLC; JOHNSON LARRY D; MARCUS BRIAN I

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: FRAME SHEAR ASSEMBLY FOR WALLS

Abstract: Source: US2002020122A Lateral motion devices are used in conjunction with shear assemblies to further dissipate shear forces on buildings. In one embodiment, the lateral motion device is interposed between the shear assembly and the upper portion of the wall to permit relative motion therebetween and to absorb and dissipate a portion of the shear forces through expansion and/or compression of spring members. In another embodiment, the lateral motion device is interposed between the foundation and the bottom of the shear assembly and in yet another embodiment, the lateral motion device is embedded in the foundation so as to be interposed between the **anchor** bolt and the foundation. The shear assembly can be either a panel assembly or an A-frame assembly.

Classifications:

International (IPC 8-9): E04B1/343 E04B1/98 E04H9/00
E04H9/02 (Advanced/Invention)

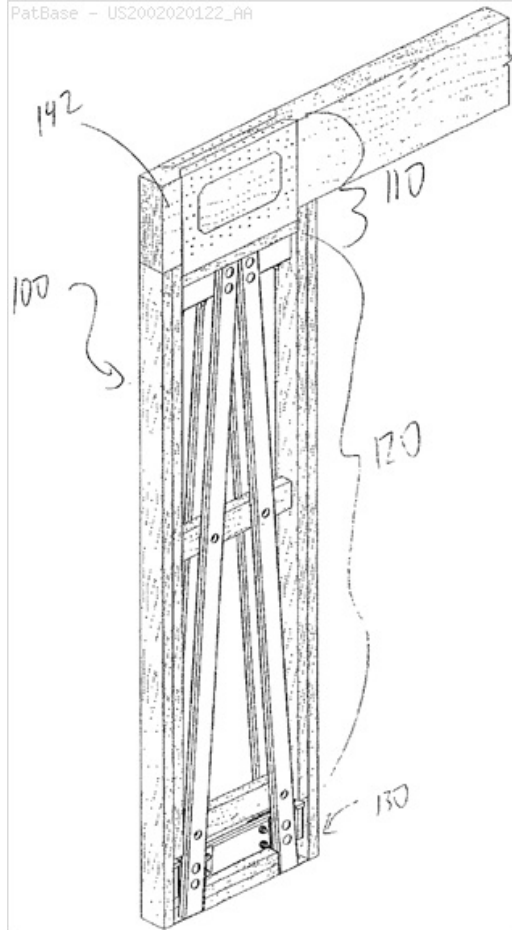
International (IPC 1-7): E04B1/98

CPC: Y02A50/14 E04H9/14 E04B1/26 E04B1/2608 E04B2001/268
E04B2001/2684 E04B2001/2696 E04H9/02 E04H9/028

European: E04B1/26 E04H9/02 E04H9/14 P04B1/26B1
P04B1/26B40 P04B1/26B40A P04B1/26S P04H9/02S

US: 52/1 52/167.1 52/167.100P 52/167.3 52/167.300P 52/167.4
52/167.400S 52/1S 52/293.3 52/295 52/300 52/573.1 52/573.100S
52/693 52/769 52/773

PatBase - US2002020122_AA

**Family:**

Publication number	Publication date	Application number	Application date
AU2002329770 AA	20030303	AU20020329770	20020815
US2002020122 AA	20020221	US20010932181	20010817
US2006277844 AA	20061214	US20060415956	20060502
US6761001 BB	20040713	US20010932181	20010817
US6871456 BA	20050329	US20040890814	20040713
US7080487 BA	20060725	US20040890480	20040713
US7174679 BA	20070213	US20050078204	20050310
US8117788 BA	20120221	US20090576191	20091008
WO03016644 A2	20030227	WO2002US26196	20020815
WO03016644 A3	20031030	WO2002US26196	20020815

Priority:

US20000226354P	20000818	US20010932181	20010817	US20050078204	20050310
US20040891421	20040713	US20040890480	20040713	US20040890814	20040713
US20090576191	20091008	WO2002US26196	20020815	US20060415956	20060502

Probable Assignee: SERRETTE REYNAUD L

Assignee(s): (std): MUELLER LEE W ; SERRETTE REYNAUD L

Inventor(s): (std): MUELLER LEE W ; SERRETTE REYNAUD L

Inventor(s): LEE W MUELLER ; MUELLER LEE

Agent(s): KNOBBE MARTENS OLSON AND BEAR LLP

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK
DM DZ EC EE ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ
LC LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NE NL NO NZ OM PH PL PT RO RU SD SE
SG SI SK SL SN SZ TD TG TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW

Title: METHOD AND APPARATUS FOR FORMING A CONTINUOUS **RAIL**

Abstract: Source: US3030494A 1. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail** for delivery to **rail** receiving means, the combination of a single railroad car containing electric welding apparatus, grinding equipment and a pusher mechanism for pushing the continuous **rail** from one end of the railroad car to the **rail** receiving means, **rail** supply means located adjacent the other end of said railroad car for supplying **rail** sections one at a time to the welding apparatus, a spot grinder for grinding portions of the top of each **rail** section near each of its ends in order to clean these portions prior to supplying the **rail** section to the welding apparatus, said welding apparatus including first and second electrodes respectively engageable with adjacent **ground** portions of successive **rail** sections to be welded together and further including means for causing current flow between the electrodes and through the ends of the **rail** sections in order to make the weld, means for shearing off a portion of the excess material of each weld, said grinding equipment including a plurality of grinding heads each including a grinding belt and respectively acting upon the top, the bottom and the side edges of the continuous **rail** in the region of the weld for the purpose of removing weld material, a first of said grinding heads being spaced from a second of said heads in the direction of travel of the continuous **rail**, said pusher mechanism including means for continuously drawing the continuous **rail** through the grinding equipment and for varying the speed of travel so that the continuous **rail** travels at relatively high speed from the welding apparatus until the weld reaches the vicinity of the second grinding head whereupon the speed decreases to a relatively low value while the weld passes the second grinding head, the last named means being operable to increase the speed of travel of the continuous **rail** to said relatively high speed as the weld passes from the second grinding head to the first grinding head, to then decrease the speed of travel to said relatively low value during movement of the weld past the first grinding head, and then to increase the speed of travel to said relatively high speed when the weld moves beyond the first grinding head. 2. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail** for delivery to **rail** receiving means, the combination of, a single railroad car containing electric welding apparatus, grinding equipment and pusher mechanism for pushing the continuous **rail** from one end of the railroad car to the **rail** receiving means, **rail** supply means located adjacent the other end of said railroad car for supplying **rail** sections one at a time to the welding apparatus, a spot grinder for grinding portions of the top of each **rail** section near each of its ends in order to clean these portions prior to supplying the **rail** section to the welding apparatus, said welding apparatus including first and second electrodes respectively engageable with adjacent **ground** portions of successive **rail** sections to be welded together and further including means for causing current flow between the electrodes and through the ends of the **rail** sections in order to make the weld, means for shearing off a portion of the excess material of each weld, said grinding equipment including a plurality of grinding heads acting upon the continuous **rail** in the region of the weld for the purpose of removing weld material, a first of said grinding heads being spaced from a second of said heads in the direction of travel of the continuous **rail**, said pusher mechanism including means for continuously drawing the continuous **rail** through the grinding equipment and for varying the speed of travel so that the continuous **rail** travels at relatively high speed from the welding apparatus until the weld reaches the vicinity of the second grinding head whereupon the speed decreases to a relatively low value while the weld passes the second grinding head, the last named means being operable to increase the speed of travel of the continuous **rail** to said relatively high speed as the weld passes from the second grinding head to the first grinding head, to then decrease the speed of travel to said relatively low value during movement of the weld past the first grinding head, and then to increase the speed of travel to said relatively high speed when the weld moves beyond the first grinding head. 3. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail** for delivery to **rail** receiving means, the combination of a single railroad car containing electric welding apparatus, grinding equipment and a pusher mechanism for pushing the continuous **rail** from one end of the railroad car to the **rail** receiving means, **rail** supply means located adjacent the other end of said railroad car for supplying **rail** sections one at a time to the welding apparatus, a spot grinder operated automatically as the **rail** sections are advanced to the welding apparatus for grinding portions of the top of each **rail** section near each of its ends in order to clean these portions prior to supplying the **rail** section to the welding apparatus, said welding apparatus including first and second electrodes respectively engageable with adjacent end portions of successive **rail** sections to be welded together and further including means for causing current flow between the electrodes and through the end portions of the **rail** sections in order to make the weld, means for shearing off a portion of the excess material of each weld, said grinding equipment being spaced from said welding apparatus and including a plurality of grinding heads spaced apart much less than the length of one **rail** section and each including a grinding belt acting upon the continuous **rail** in the region of the weld for the purpose of removing weld material, means for normally preventing engagement of said belts with said continuous **rail** but automatically effective when the continuous **rail** is advanced to a position where the welded joint is in the vicinity of the grinding equipment to move the belts against the **rail** to remove the excess weld material, and said pusher mechanism including means for advancing the continuous **rail** from the welding apparatus through the grinding equipment and for directing the free end of the continuous **rail** out of said railroad car and onto the **rail** receiving means. 4. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail** for delivery to **rail** receiving means, the combination of a single railroad car containing electric welding apparatus, grinding equipment and a pusher mechanism for pushing the **rail** from one end of the car to the **rail** receiving means, power driven **rail** supply means located adjacent the other end of said railroad car for supplying **rail** sections one at a time to the welding apparatus and into abutting end to end relationship with the continuous **rail**, said welding apparatus including means for causing current flow through the abutting ends of the **rail** section and the continuous **rail** in order to make the weld, means for shearing off a portion of the excess material of each weld, said grinding equipment being spaced from said welding apparatus and being normally ineffective to grind said continuous **rail**, said grinding equipment further including means automatically operated when the continuous **rail** is advanced by the pusher mechanism from the welding apparatus to position where the welded joint reaches the vicinity of the grinding equipment to render said equipment effective to act upon the continuous **rail** in the region of the weld to remove excess weld material, and said pusher mechanism including means for advancing the continuous **rail** from the welding apparatus through the grinding equipment and for directing the free end of the continuous **rail** out of said railroad car and onto the **rail** receiving means. 5. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail**, the combination of electric welding apparatus, grinding equipment, a pusher mechanism for passing the continuous **rail** from the welding apparatus to the grinding equipment, means for supplying **rail** sections one at a time to said welding apparatus, a spot grinder for grinding spaced portions of the top of each **rail** section near each of its ends in order to clean these portions prior to supplying the **rail** section to the welding apparatus, said welding apparatus including first and second electrodes respectively engageable with adjacent **ground** portions of successive **rail** sections to be welded together and further including means for causing current flow between the electrodes and through the ends of the **rail** sections in order to make the weld, means for shearing off a portion of the excess material of each weld, said grinding equipment including a plurality of grinding heads respectively acting upon the top, the bottom and the side edges of the continuous **rail** in the region of the weld for the purpose of removing weld material, a first of said grinding heads being spaced from a second of said heads in the direction of travel of the continuous **rail** and by a distance much less than the length of one **rail** section, said pusher mechanism including means for varying the speed of travel so that the continuous **rail** travels at relatively high speed from the welding apparatus until the weld reaches the vicinity of the second grinding head whereupon the speed decreases to a relatively low value while the weld passes the second grinding head, the last named means being operable to increase the speed of travel of the continuous **rail** to said relatively high speed as the weld passes from the second grinding head to the first grinding head, to then decrease the speed of travel to said relatively low value during movement of the weld past the first grinding head, and then to increase the speed of travel to said relatively high speed when the weld moves beyond the first grinding head. 6. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail**, the combination of electric welding apparatus, grinding equipment, a pusher mechanism for passing the continuous **rail** from the welding apparatus to the grinding equipment, means for supplying **rail** sections one at a time to said welding apparatus, said welding apparatus including first and second electrodes respectively engageable with adjacent end portions of successive **rail** sections to be welded together and further including means for causing current flow between the electrodes and through the ends of the **rail** sections in order to make the weld, said grinding equipment including a plurality of grinding heads respectively acting upon the top, the bottom and the side edges of the continuous **rail** in the region of the weld for the purpose of removing weld material, a first of said grinding heads being spaced from a second of said heads in the direction of travel of the continuous **rail** and by a distance much less

PatBase PDF Export - Page: 13 19/02/2018

portion of the excess material of each weld, said grinding equipment including grinding means acting upon the continuous rail in the region of the weld for the purpose of removing weld material, and control means including an electrical control circuit for automatically operating the rail transfer device, the rail supplying means, the welding apparatus, the shearing means, the grinding equipment and said mechanism in predetermined sequence in order to weld the rail sections one at a time to the continuous rail, said control circuit including switch means actuated when the rail section is in position in the rail supplying means for advancement to the welding apparatus said control circuit also including means rendered effective when the rail section is disposed in abutting end to end relationship with the continuous rail for moving the electrodes into engagement with the ends of the rail sections and for supplying welding current through the ends of the rail sections, said control circuit including means operated at the completion of the welding operation for rendering the shearing means effective to shear portions of the weld, and said control circuit also including means operated following the shearing for rendering the mechanism effective to move the completed weld to the grinding equipment. 12. In an apparatus for welding rail sections together in end to end relationship to form a continuous rail, the combination of electric welding apparatus, grinding equipment, mechanism for passing the continuous rail from the welding apparatus to the grinding equipment, means for supplying rail sections one at a time to said welding apparatus, a rail transfer device for supplying rail sections one at a time to the supplying means, said welding apparatus including first and second electrodes respectively engageable with adjacent end portions of successive rail sections to be welded together and further including means for causing current flow between the electrodes and through the ends of the rail sections in order to make the weld, said grinding equipment including grinding means acting upon the continuous rail in the region of the weld for the purpose of removing weld material, and control means including an electrical control circuit for automatically operating the rail transfer device, the rail supplying means, the welding apparatus, the grinding means and said mechanism in predetermined sequence in order to weld the rail sections one at a time to the continuous rail, said control circuit including switch means actuated when the rail section is supplied from the rail transfer device to the rail supplying means, said switch means when actuated rendering the rail supplying means effective to advance the rail section to the welding apparatus, said control circuit also including means rendered effective when the rail section is disposed in abutting end to end relationship with the continuous rail for moving the electrodes into engagement with the ends of the rail sections and for supplying welding current through the ends of the rail sections for a predetermined period, said control circuit including means operated following said predetermined period for rendering the mechanism effective to move the completed weld to the grinding equipment, said control circuit including means operable following a predetermined time delay period sufficient to permit testing of the weld for rendering the rail transfer device effective to supply another rail section to the supplying means in order to initiate a new cycle of operation. 13. In an apparatus for welding rail sections together in end to end relationship to form a continuous rail, the combination of electric welding apparatus, grinding equipment, mechanism for passing the continuous rail from the welding apparatus through the grinding equipment, means for supplying rail sections one at a time to said welding apparatus for disposition in abutting end to end relationship with the continuous rail, a spot grinder operated automatically when the rail sections are advanced to the welding apparatus for grinding spaced apart portions of each rail section near each of its ends in order to clean these portions prior to supplying the rail section to the welding apparatus, said welding apparatus including first and second electrodes respectively engageable with adjacent cleaned portions of successive rail sections to be welded together and further including means for causing current flow between the electrodes and through the ends of the rail sections in order to make the weld means for shearing off a portion of the excess material of each weld, said grinding equipment being spaced from the welding apparatus and including a plurality of grinding heads automatically effective to act upon the continuous rail in the region of the weld when the continuous rail is advanced by said mechanism, thereby to remove additional excess weld material, and means for automatically operating the rail supplying means, the spot grinder, the welding apparatus, the shearing means, the grinding equipment and said mechanism in sequence to join a rail section to the continuous rail and to remove at least a portion of the excess weld material around the welded joint. 14. In an apparatus for welding rail sections together in end to end relationship to form a continuous rail, the combination of electric welding apparatus, grinding equipment, mechanism for passing the continuous rail from the welding apparatus through the grinding equipment, means for supplying rail sections one at a time to said welding apparatus for disposition in abutting end to end relationship with the continuous rail, said welding apparatus including first and second electrodes respectively engageable with adjacent portions of the rail section and the continuous rail and further including means for causing current flow between the electrodes and through the ends of the rail sections in order to make the weld, means for shearing off a portion of the excess material of each weld, said grinding equipment being spaced from the welding apparatus and including a plurality of grinding heads automatically effective to act upon the continuous rail in the region of the weld when the continuous rail is advanced by said mechanism thereby to remove additional excess weld material in the weld region, and means for automatically operating the rail supplying means, the welding apparatus, the shearing means, the grinding equipment and said mechanism in sequence to join a rail section to the continuous rail and to remove at least a portion of the excess weld material around the welded joint. 15. In an apparatus for welding rail sections together in end to end relationship to form a continuous rail, the combination of electric welding apparatus, grinding equipment, a mechanism for passing the continuous rail from the welding apparatus through the grinding equipment, means for supplying rail sections one at a time to said welding apparatus for disposition in abutting end to end relationship with the continuous rail, said welding apparatus including first and second electrodes respectively engageable with adjacent portions of the rail section and the continuous rail and further including means for causing current flow between the electrodes and through the ends of the rail sections in order to make the weld, said grinding equipment being spaced from the welding apparatus and including a plurality of grinding heads automatically effective to act upon the continuous rail in the region of the weld when the continuous rail is advanced by said mechanism, thereby to remove excess weld material in the weld region, and means for automatically operating the rail supplying means, the welding apparatus, the grinding equipment and said mechanism in sequence to join a rail section to the continuous rail and to remove the excess weld material. 16. In an apparatus for welding rail sections together in end to end relationship to form a continuous rail for delivery to rail receiving means, the combination of a single railroad car containing welding apparatus, grinding equipment and a pusher mechanism, power driven rail supply means located adjacent the other end of the said railroad car for supplying rail sections one at a time to the welding apparatus and into abutting end to end relationship with the continuous rail, said welding apparatus including means for welding together the abutting ends of the rail section and the continuous rail, means for shearing off a portion of the excess material of each weld, said grinding equipment including means automatically operated when the continuous rail is advanced and acting upon the continuous rail in the region of the weld to remove excess weld material, and said pusher mechanism including means for advancing the continuous rail from the welding apparatus through the grinding equipment and for pushing the continuous rail out of said car and onto the rail receiving means. 17. In apparatus for welding rail sections together in end to end relationship to form a continuous rail, the combination of welding apparatus, grinding equipment, a pusher mechanism for passing the continuous rail from the welding apparatus to the grinding equipment, means for supplying rail sections one at a time to said welding apparatus, said welding apparatus including means for welding each rail section to the end of the continuous rail, said grinding equipment including a plurality of grinding heads respectively acting upon the top, the bottom and the side edges of the continuous rail in the region of the weld for the purpose of removing weld material, a first of said grinding heads being spaced from a second of said heads in the direction of travel of the continuous rail, said pusher mechanism including means for varying the speed of travel so that the continuous rail travels at a relatively high speed from the welding apparatus until the weld reaches the vicinity of the second grinding head whereupon the speed decreases to a relatively low value while the weld passes the second grinding head, the last named means being operable to increase the speed of travel of the continuous rail to said relatively high speed as the weld passes from the second grinding head to the first grinding head, to then decrease the speed of travel to said relatively low value during movement of the weld past the first grinding head, and then to increase the speed of travel to said relatively high speed when the weld moves beyond the first grinding head. 18. In an apparatus for welding rail sections together in end to end relationship to form a continuous rail, the combination of welding apparatus, grinding equipment, mechanism for passing the continuous rail from the welding apparatus through the grinding equipment, means for supplying rail sections one at a time to said welding apparatus for disposition in abutting end to end relationship with the continuous rail, said welding apparatus including means for welding the abutting ends together, means for shearing off a portion of the excess material of each weld, said grinding equipment including a plurality of grinding heads acting upon the continuous rail in the region of the weld for the purpose of removing weld material, and means for automatically operating the rail supplying means, the welding apparatus, the shearing means, the grinding equipment and said mechanism in sequence to join a rail section to the continuous rail. 19. In an apparatus for welding rail sections together in end to end relationship to form a continuous rail, the combination of welding apparatus, grinding equipment, a mechanism for passing the continuous rail from the welding apparatus through the grinding equipment, means for supplying rail sections one at a time to said welding apparatus for disposition in abutting end to end relationship with the continuous rail, said welding apparatus including means for welding the abutting ends together, said grinding equipment including a plurality of grinding heads acting upon the continuous rail in the region of the weld for the purpose of removing weld material, and means for automatically operating the rail supplying means, the welding apparatus, the shearing means, the grinding equipment and said mechanism in sequence to join a rail section to the continuous rail.

ineais for automatically operating the **rail** supplying means, the welding apparatus, the grinding equipment and said iriechanism in sequeice to join a **rail** section to the continuous **rail**. 20. In an apparatus _lor welding **rail** sect'.Ons together in end to end relationship to form a continuous **rail**, the combination of welding apparatus, grinding eqtiipmeit, mechanism for passiiig the continuous **rail** fromi the welding apparatus to the grinding equipment, means for supplyin.- **rail** sections one at a time to said welding apparatus, said welding apparatus -including means for welding each **rail** sectioii to the end of the continuous **rail**, means for shearing off a portion of the excess material of each weld, said grin(iing equipment including grinding means acting upon the continuous **rail** in the region of the weld for th6 purpose of removing weld material, aid control means including an electrical control circuit for automatically operatin_ 'l.he **rail** transfer device, the **rail** supplying means, the welding apparatus, the shearing m-eans, the grinding equipment and said mechanism in predetermined sequence in order to weld the **rail** seefions one at a time to the continuous **rail**, said control circuit in- 7o cluding switch means actuated when the **rail** section is in position in the **rail** supplying meaps for advancement to the welding apparatus, said cotitrol circuits also including means rendered effective when the **rail** section is disposed in abutting end to end relationship with the con- tinuous **rail** for rendering the welding apparatus effective to make the weld, said cor_trol circuit including rneans operated at the comple'tion of the welding operation for rendering the shearing means effective to shear portions _of the weld, and said control circuit also including means operated following the shearing for rendering the mecha- nism effective to move the completed weld to the grinding equipmen_. 211. A method of joining together a plurality of **rail** sections to form a continuous **rail**, said meth6d con- iprising the steps of supplying **rail** sections one at a time and in end to end relationship, grinding electrode receiving portions respectively Jocated near the opposed ends of each **rail** section, welding together the ends of adjacent **rail** sections by means of a welding apparatus including electrodes e-ngageable with the electrode receiv- 1,5 ing portions of the rai.1 sections, shearing off excess weld metal surrouliding the weld, gridding the **rail** in the vicinity of the ,Yeld at a plurality Df spaced apart grind- ;,n.- stations, pullin.- the **rail** so that the weld moves from he welding apparatus to the first of the grinding sta- tions at relatively hi,-h speed, pulling the **rail** at relatively slow speed as the weld passes through each grinding station and pulling it at relatively high speed as the welct passes between the grinding stations, and pushing the, gr6und **rail** to a **rail** stora.e area. 22. A method of joining together a plurality of **rail** sections toform a continuous **rail**, said method comprising the ste , ps 6f supplying **rail** sections one at a time and in end,to end relationship, grindiii.- electrode receivin-, portions respectively located near the opposed ends of each **rail** section, _welding together the ends of adjacent **rail** sections by means of a welding apparatus including electrodes en,_ageyble with the electrode receiving portions of -the **rail** sections, grinding the **rail** in the vicinity of the xveld at a plurality of spaced apart grinding stations, pulling the **rail** so that the weld moves from the welding apparatus to the first of the grinding stations at relatively high speed, pulling the **rail** a-t rel,,itively slow speed as the weld passes througb each grinding station and pulling it it relatively hi.-h speed as the weld passesbetween the grindin.- stations, and ptishing the **ground rail** to a **rail** storage area. 23. In an apparatus for forming a continuous **rail** by passing individual **rail** sections one at a time and in sequence to a welding Tnechanisrh which joins the leading end of each section to the trailing end of the preceding see I tion, the com_bination of means for moving the contirluous **rail** th,rough the welding mechanism a_fter the weld has been made, means located at a fixed predetermined point in advance of the welding mechanism for sensin_ .5 t-he arrival of the trailing end of the **rail** at said point, and a circuit including the last named means for rendering the **rail** moving r_icans effective to move the **rail** through a predetermined distance following arrival of the trailing end of the **rail** at said predetermined point and for ,then rendering the **rail** moving means ineffective _to move the **rail**, whereby the continuous **rail** is stopped at a desired position within the welding mechanism irrespective of variations in length of the **rail** sections, 24. The apparatus _defined by claim 23 wherein the sensing means comprises a limit switch en.-aged by the contiruous **rail** during its movenient and disengaged when the trailino, end of tlae **rail** passes said predetermined point. 25. The apparatus defined by claim 23 wherein the control circuit includes a counter mechanism whose op- r,5 eration is initiated by the sensing means, said counter mechanism being driven by the **rail** during movement of the latter and including switch means conilected in said circuit to render the **rail** movin.- means ineffective to move the **rail** after the counter niechanism completes a pre- selected number of cotints. 26. The lapparatus defined by claim 25 wherein the s.-nsing means comprises a limit switch engaged by the continuous **rail** during its movement and disengaged when ihe, iiaiiing end of th -e raB passes said predeteriiiiend point. 27. A method of ,ormin.- a continuous **rail** fromfirst second, third, fourth and fifth **rail** sections, said method comprising the steps of supplying said **rail** sections successively and in the order named -to welding ap'paratus where the elids of the **rail** sections are welded together, passii.- the welded joints throuigh a grinding station whe_-C each joint is **ground** to remove a portion of the excess n-ietal, passin.a the welded **rail** to a testing station, testing the weld at the latter station, the above steps being so carried out that the weld b_etween the first and second sections is tested while the third and fourth sections are being welded together, and with the weld - between th third and fourth sections being pass-,d through the grinding station while the fifth section is beig stipplied to the welding apparatus. 28. A method of forming a continuous **rail** from first, second, third, fourth, fifth, sixth and seventh **rail** sections, said method comprising the steps of supplying said **rail** sections successively and in the order named to weldingapparattis where the e.-ids of the **rail** sections are welded to_ether, passing the welded joints through a grinding station where each joint is **ground** to remove a portion of tl-ie excess metal, passing the welded **rail** to a testing station, testing the weld at the la-tter station, the above steps being so carried out that the Nveld between the first aaid second sections is tested while the third and fourth sections are b,-ing welded to-c_ther, the weld between the third and fourth sections being passed through the grinding station while the fifth section is being supplied to the welding apparatus, the weld between the second and third sections being tested while the ends of ihe fourth and fifth sections are being welded together and the weld betw-.en the fourth and fifth sections being passed throtigil the griiiding station while the sixth **rail** section is being supplied to the welding apparatus, the weld betwee.n the third and fourth sections being tested while the ends of the fifth and sixth sections are being welded together, and the weld between the fifth and sixth sections being passed through the grinding station while the seventh **rail** section is being supplied to the welding apparatus. 29. In an apparatus for forming a continuous **rail** by welding together **rail** sections supplied in sequence to a weldin.- mechanism, said mechanism being of the type having a plurality of movable clamps mounted upon a riovable carriage and engageable with the **rail** section to lock the latter to the carriage, at least one of said clamps including a fluid pressure operated piston and cylinder assembly for applying and retracting said one clamp by moving it towards and away from the **rail** section, said mechanism also including a plurality of stationary clamps at least one of which is provided with a piston and cylinder for moving it into and out of engagement with the continuous **rail**, -said mechanism furtherbeing provided with means incltiding a plurality of welding electrodes, at least one of which is connected to a piston and cylinder for moving it into and out of engagement with the **rail** section and another of which is connected to a piston and cylinder for moving it into and out of engagement with the continuous **rail**, for passing current: through the ends of the **rail** section and the continuous **rail** in order to heat them, said mechanism including a carriage operating piston and cylinder for reciprocating th , e carriage to - flash the ends of the **rail** and the **rail** section while the current is passing therethrough and for then forcing said ends together to complete the weld and to create an upset therearound, said mechanism being provided with means includin.- a shear box mounted on said carriage and surrounding the **rail** section for shearing the upset around the weld, the last named means including a shear box operating piston and cylinder for extending and retracting the shear box by moving it along the **rail** section upon the carria.-e, _the improvement which comprises a control circuit f6r sequentially operating the piston and cylinde,rs in such manner that the stationary and movable claipps are first moved into respective engagement with th,e **rail** and the raR section, the welding electrodes are next moved into engagement with the **rail** and the **rail** section and the current is then passed thro.u.-h the electrodes, the carriage c_-Derating cylinder is next rendered effective to reciprocate the carriage and to make the weld, the welding electrodes are then disengaged from the **rail** and the **rail** section, the movable clamps are then disengaged from the **rail** section, the shear box operating piston and cylinder is rendered effective to move the shear box along the **rail** section towards the upset, the movable clamps are then applied to lock the shear box to the carriage, the carriage operating piston and cylinder is then rendered effective to move the carriage in a direction to drive the shear box through the upset and is then rendered effective to move the carriage in the reverse direction, the movable clamps are then retracted and the shear box operating piston apd cylinder is then rendered effective to retract the shear box by moving it along the **rail** se.-tion away from the weld. 3 0. The apparatus defined by claim 29 wherein the control circuit includes limit switches actuated by the movements of the stationary and movable clamps, the welding electrodes, the shear box and the carriage for rendering the circuit automatically effective to make the weld and shear the upset as soon as -the **rail** section and the **rail** are properly aligned in end to end relationship within the welding mechanism. 31. In an apparatus for forming a contintuous **rail** by welding together **rail** sections supplied in sequence to a welding _mechanism, said mechanism being of the type having a plurality of movable clamps mounted upon a movable carriage and engageable with the **rail** section to lock the latter to the carriage, at least one of said clamps including a fluid pressure operated piston and cylinder assembly for applying and retracting said one clamp by moving it towards and away from the **rail** section, said mechanism also including a plurality of stationary clamps at least one of which is provided with a piston and cylinder for moving it into and out of engagement with the continuous **rail**, said mechanism further being provided with means including a plurality of welding electrodes at least one of which is connected to a piston and c-yylinder for moving it into and out of ciigagement w.,h the Tail section and another of which is connected,to a piston and cylinder for moving it in'Lo and out of

eigagement with the continuous **rail**, for passing current through the ends of the **rail** section and the continuous **rail** in order to heat them, said mechanism including a carriage operating piston and cylinder for reciprocating the carriage to flash the ends of the **rail** and th- **rail** section while the current is passing therethrough and for then advancing the carriage to force said ends together to complete the weld and to create an upset therearound, said mechanism being provided with means including a shear box mounted on said carriage and surrounding the **rail** section for shearing the upset around the weld, the last named means including a shear box operating piston and cylinder for extending and retracting the shear box by moving it along the **rail** section upon the carriage, the improvement which comprises an automatic control circuit for sequentially operating the piston and cylinders in such manner that the stationary and movable clamps are first moved into respective engagement with the **rail** and the **rail** section, said circuit including first limit switch means actuated by the application of the movable and stationary clamps for next rendering the piston and cylinders associated with the welding electrode effective to move the latter electrodes into engagement with the **rail** and the **rail** section and for then passing the current between the electrodes, second limit switch means operated when the electrodes are applied for rendering the carriage operating cylinder effective to reciprocate the carriage and to make the weld, third limit switch means actuated when the carriage is fully advanced to complete the weld for rendering the piston and cylinders connected to the electrodes effective to retract the electrodes and to render the piston and cylinder associated with said one movable clamp effective to disengage the latter clamp from the **rail** section, fourth limit switch means actuated when the said one movable clamp is retracted to render the shear box operating piston and cylinder effective to extend the shear box along the **rail** section towards the upset, fifth limit switch means actuated when the shear box extended for rendering the piston and cylinder associated with said one movable clamp effective to apply the latter in order to lock the shear box to the carriage, said first limit switch means being effective when said one movable clamp is applied to render the carriage operating piston and cylinder effective to move the carriage in a direction to drive the shear box through the upset, said third limit switch means being effective when the carriage is advanced to render the carriage operating piston and cylinder effective to move the carriage in the reverse direction in order to retract the carriage, sixth limit switch means actuated when the carriage is retracted to render the piston and cylinder associated with said one movable clamp effective to retract said one clamp, said fourth limit switch means being effective when said one clamp is retracted to render the shear box operating piston and cylinder effective to retract the shear box by moving it along the **rail** section away from the weld. 32. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail**, the combination of electric welding apparatus, grinding equipment, pusher mechanism for passing the continuous **rail** from the welding apparatus to the grinding equipment and for pushing the **rail** to a storage area, said pusher mechanism including a brake effective to stop the mechanism in order to hold the **rail** with its trailing end disposed within the welding apparatus, means for supplying **rail** sections one at a time to said welding apparatus, control means including an electrical control circuit for automatically operating the **rail** supplying means, the welding apparatus, the grinding equipment and said pusher mechanism in predetermined sequence in order to weld the **rail** sections one at a time to the continuous **rail**, said control circuit including switch means actuated when a **rail** section is disposed in the **rail** supplying means in position to be advanced to the welding apparatus, said switch means when actuated rendering the **rail** supplying means effective to advance the **rail** section to the welding apparatus, said control circuit also including means rendered effective when the **rail** section is disposed in abutting end to end relationship with the continuous **rail** for applying the brake on the pusher mechanism in order to hold the **rail** in position while a weld is being made, and said control circuit also including means operated after the weld has been made for releasing the brake on the pusher mechanism and for rendering the pusher mechanism effective to move the completed weld to the grinding equipment. 33. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail**, the combination of electric welding apparatus, grinding equipment, pusher mechanism for passing the continuous **rail** from the welding apparatus to the grinding equipment and for pushing the **ground rail** to a **rail** storage area, said pusher mechanism including a brake effective to stop the mechanism in order to hold the **rail** with its trailing end disposed within the welding apparatus, means for supplying **rail** sections one at a time to said welding apparatus, a **rail** transfer device for supplying **rail** sections one at a time to the supplying means, means for shearing off a portion of any excess material around each weld, said grinding equipment including a grinding belt acting upon the continuous **rail** in the region of the weld for the purpose of removing weld material and a plurality of pressure operated means for forcing the belt against the **rail**, and control means including an electrical control circuit for automatically operating the **rail** transfer device, the **rail** supplying means, the welding apparatus, the shearing means, the grinding means and said pusher mechanism in predetermined sequence in order to weld the **rail** sections one at a time to the continuous **rail**, said control circuit including switch means actuated when the **rail** section is supplied from the **rail** transfer device to the **rail** supplying means, said switch means when actuated rendering the **rail** supplying means effective to advance the **rail** section to the welding apparatus, said control circuit also including means rendered effective when the **rail** section is disposed in abutting end to end relationship with the continuous **rail** for applying the brake on said pusher mechanism while the weld is being made, said control circuit including means operated after the weld has been made for rendering the shearing means effective to shear off portions of the weld, said control circuit also including means operated following the shearing for releasing the brake on said pusher mechanism and for rendering the pusher mechanism effective to move the completed weld to the grinding equipment, said control means further including means operated in response to movement of the weld for releasing the pressure operated means effective in sequence to force the belt against the **rail**. 34. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail** for delivery to **rail** receiving means, the combination of electric welding apparatus, grinding equipment and a pusher mechanism for passing the continuous **rail** from the end of the welding apparatus through the grinding equipment to a **rail** storage area, said pusher mechanism including a brake for stopping the pusher mechanism to hold the **rail** with its trailing end disposed within the welding apparatus, **rail** supply means located adjacent the other end of said welding apparatus, said **rail** supply means including a **rail** transfer device for storing **rail** sections and supplying them one at a time to power driven means for feeding each **rail** section to the welding apparatus after it is supplied from the **rail** transfer device, said grinding equipment including a plurality of grinding heads each including a grinding belt and acting upon different portions of the continuous **rail** in the region of the weld for the purpose of removing weld material, a first of said grinding heads being spaced from a second of said heads in the direction of travel of the continuous **rail**, and a control circuit operable to apply the brake on said pusher mechanism while the weld is being made and to release the brake after the weld is completed to render the pusher mechanism effective to draw the continuous **rail** through the grinding equipment, said control circuit including means for varying the speed of travel, said speed varying means including counter mechanism driven by the **rail** movement and rendered effective to begin its count when the weld is completed, said counter mechanism being effective during a first predetermined interval while the weld moves from the welding apparatus to the vicinity of the second grinding head to cause the pusher mechanism to move the **rail** at relatively high speed, said counter mechanism being effective at the expiration of said first interval to render the pusher mechanism effective to move the **rail** at relatively low speed for a second interval while the weld passes the second grinding head, the counter mechanism being operated after said second interval to increase the speed of travel of the continuous **rail** to said relatively high speed during a third interval as the weld passes from the second grinding head to the first grinding head and at the expiration of said third interval to decrease the speed of travel to said relatively low value for a fourth interval during movement of the weld past the first grinding head, said counter mechanism being effective at the expiration of the fourth interval to render the pusher mechanism effective to increase the speed of travel of the **rail** to said relatively high speed for a fifth interval after the weld moves beyond the first grinding head, said counter mechanism being effective at the expiration of the fifth interval to render the control circuit effective to apply the brake to hold the continuous **rail** in position for the next weld. 35. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail** for delivery to **rail** receiving means, the combination of a single wheeled vehicle containing electric welding apparatus, flash removing means and pusher mechanism for pushing the continuous **rail** from the end of the vehicle to the **rail** receiving means, **rail** supply means located adjacent the other end of said vehicle for supplying **rail** sections one at a time to the welding apparatus, a spot grinder operated automatically as the **rail** sections are advanced to the welding apparatus for grinding portions of each **rail** section near each of its ends in order to clean these portions prior to supplying the **rail** section to the welding apparatus, said welding apparatus including first and second electrodes respectively engageable with adjacent cleaned end portions of successive **rail** sections to be welded together and further including means for causing current flow between the electrodes and through the end portions of the **rail** sections in order to make the weld, said flash removing equipment being spaced from said welding apparatus and including means acting upon the continuous **rail** in the region of the weld for the purpose of removing weld flash material, and said pusher mechanism including means for advancing the continuous **rail** from the welding apparatus through the flash removing means and for directing the free end of the continuous **rail** out of said vehicle and onto the **rail** receiving means. 36. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail** for delivery to **rail** receiving means, the combination of a single wheeled vehicle containing electric welding apparatus, flash removing means and a pusher mechanism for pushing the continuous **rail** from one end of the vehicle to the **rail** receiving means, **rail** supply means located adjacent the other end of said vehicle for supplying **rail** sections one at a time to the welding apparatus, a spot grinder operated automatically as the

rail sections are advanced to the welding apparatus for grinding portions of each **rail** section near each of its ends in order to clean these portions prior to supplying the **rail** section to the welding apparatus, said welding apparatus including first and second electrodes respectively engageable with adjacent cleaned end portions of successive **rail** sections to be welded together and further including means for causing current flow between the electrodes and through the end portions of the **rail** sections in order to make the weld, said flash removing means being spaced from said welding apparatus and acting upon the continuous **rail** in the region of the weld for the purpose of removing at least a portion of the weld flash material, means for normally preventing engagement of said flash removing means with said continuous **rail** but effective when the continuous **rail** is advanced to a position where the welded joint is in the vicinity of the flash removing means to act against the **rail** to remove the excess weld flash material, and said pusher mechanism including means for advancing the continuous **rail** from the welding apparatus through the flash removing means and for directing the free end of the continuous **rail** out of said vehicle and onto the **rail** receiving means. 37. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail** for delivery to **rail** receiving means, the combination of a single wheeled vehicle containing electric welding apparatus, flash removing means and a pusher mechanism for pushing the continuous **rail** from one end of the vehicle to the **rail** receiving means, power driven **rail** supply means located adjacent the other end of said car for supplying **rail** sections one at a time to the welding apparatus and into abutting end to end relationship with the continuous **rail**, said welding apparatus including means for causing current flow through the abutting ends of the **rail** section and the continuous **rail** in order to make the weld, said flash removing means being spaced from said welding apparatus and including means for removing at least a portion of the flash surrounding the **rail** when the continuous **rail** is advanced by the pusher mechanism from the welding apparatus to a position where the welded joint reaches the vicinity of the flash removing means, and said pusher mechanism including means for advancing to the continuous **rail** from the welding apparatus through the flash removing means and for directing the free end of the continuous **rail** out of said vehicle and onto the **rail** receiving means. 38. In an apparatus for welding **rail** sections together in end to end relationship to form a continuous **rail** for delivery to **rail** receiving means, the combination of a single wheeled vehicle containing electric welding apparatus, flash removing means and a pusher mechanism for means located adjacent the other end of said vehicle for supplying **rail** sections one at a time to the welding apparatus and into abutting end to end relationship with the continuous **rail**, said welding apparatus including means for causing current flow through the abutting ends of the **rail** section and the continuous **rail** in order to make the weld, said flash removing means being spaced from said welding apparatus and being normally ineffective to act upon said continuous **rail**, said flash removing means further including means operated when the continuous **rail** is advanced by the pusher mechanism from the welding apparatus to a position where the welded joint is adjacent the flash removing means to render said flash removing means effective to act upon the continuous **rail** in the region of the weld to remove excess weld flash material, and said pusher mechanism including means for advancing the continuous **rail** from the welding apparatus through the flash removing means and for directing the free end of the continuous **rail** out of said vehicle and onto the **rail** receiving means. 39. In a welding apparatus for forming a continuous **rail** by joining together individual **rail** sections in end to end relationship, the combination of means for moving the continuous **rail** through mechanism for acting upon the **rail**, sensing means located at a fixed station in advance of said mechanism for sensing the arrival of a predetermined point on the **rail** at said station, and a control circuit including the sensing means for rendering the **rail** moving means effective to move the **rail** through a predetermined distance following arrival of said predetermined point on the **rail** at said station and for then developing a control signal. 40. The apparatus defined by claim 39 wherein the control circuit includes a counter mechanism the operation of which is initiated by the sensing means, said counter mechanism being driven by the **rail** driving movement of said predetermined point through said predetermined distance and including means for developing said control signal after said counter mechanism completes a predetermined number of counts. 41. The apparatus defined by claim 39 wherein means are provided for responding to the control signal to render the **rail** moving means ineffective to move the **rail**, thereby to stop the continuous **rail** at a desired position with respect to said mechanism irrespective of variations in length of the **rail** sections. 42. The apparatus defined by claim 40 wherein means are provided for responding to the control signal to render the **rail** moving means ineffective to move the **rail**, there being a signal for rendering said mechanism effective to act upon the **rail** as soon as said predetermined point has traversed said predetermined distance. 44. The apparatus defined by claim 40, wherein means are provided responsive at least in part to said control signal for rendering said mechanism effective to act upon the **rail** as soon as said predetermined point has traversed said predetermined distance. 45. A method of forming a continuous **rail** from first, second, third, fourth and fifth **rail** sections, the method comprising the steps of supplying said **rail** sections successively and in the order named to welding apparatus where the ends of the **rail** sections are welded together, passing the welded joints through a flash removing station where at least a portion of the excess flash metal surrounding each weld is removed, passing the welded **rail** to a testing station, testing the weld at the latter station, the above steps being so carried out that the weld between the first and second sections is tested while the third and fourth sections are being welded together, and with the third and fourth sections being passed through the flash removing station as it moves from the welding apparatus to the testing station. 46. A method of forming a continuous **rail** from first, second, third, fourth and fifth **rail** sections, the method comprising the steps of supplying said **rail** sections successively and in the order named to the welding apparatus, grinding portions of the periphery of each **rail** section respectively located near its opposed ends prior to supplying the **rail** section to the welding apparatus, passing electric current between adjacent ends of successive **rail** sections by means of electrodes in the welding apparatus in engagement with the **ground** peripheral portions of the adjacent ends of the successive **rail** sections in order to weld together the ends of the **rail** sections and then forcing the **rail** sections together to form a flash upset surrounding the welded joint, passing the welded joints through a flash removing station where at least a portion of the excess flash metal around each joint is removed, passing the welded **rail** to a testing station, testing the weld at the latter station, the above steps being so carried out that the weld between the first and second sections is tested while the third and fourth sections are being welded together, and with the third and fourth sections being passed through the flash removing station as it moves from the welding apparatus to the testing station. 47. The method defined by claim 46 wherein the grinding of the peripheral portions of each **rail** section is carried out while the **rail** section is in motion in passing to the welding apparatus. 48. A method of forming a continuous **rail** from first, second, third, fourth and fifth **rail** sections, the method comprising the steps of supplying said **rail** sections successively and in the order named to welding apparatus, grinding portions of the periphery of each **rail** section respectively located near its opposed ends prior to supplying the **rail** section to the welding apparatus, passing electric current between adjacent ends of successive **rail** sections by means of electrodes in the welding apparatus in engagement with the **ground** peripheral portions of the adjacent ends of the successive **rail** sections in order to weld together the ends of the **rail** sections and then forcing the **rail** sections together to form a flash upset surrounding the welded joint, passing the welded joints through a grinding station where each joint is **ground** to remove at least a portion of the excess metal, passing the welded **rail** to a testing station, testing the weld at the latter station, the above steps being so carried out that the weld between the first and second sections is tested while pushing the continuous **rail** from one end of the vehicle, third and fourth sections are being welded together, and to the **rail** receiving means, power driven **rail** supply means, the weld between adjacent ends of the **rail** sections and the peripheral portions of each **rail** section is carried out while the **rail** section is in motion in passing to the welding apparatus. 50. A method of forming a continuous **rail** from first, second, third, fourth, fifth, sixth and seventh **rail** sections, said method comprising the steps of supplying said **rail** sections successively and in the order named to welding apparatus where the ends of the **rail** sections are welded together and by then forcing the adjacent **rail** sections together to form a flash upset, passing the welded joints through a grinding station where each joint is **ground** to remove a portion of the flash upset, passing the welded **rail** to a testing station, testing the weld at the latter station, the above steps being so carried out that the weld between the first and second sections is tested while the third and fourth sections are being welded together, the weld between the third and fourth sections being passed through the grinding station as it passes from the welding apparatus to the testing station, the weld between the second and third sections being tested while the ends of the fourth and fifth sections are being welded together and the weld between the fourth and fifth sections being passed through the flash removing station as it passes from the welding apparatus to the testing station, the weld between the third and fourth sections being tested while the ends of the fifth and sixth sections are being welded together, and the weld between the fifth and sixth sections being passed through the grinding station as it passes from the welding apparatus to the testing station. 51. A method of forming a continuous **rail** from first, second, third, fourth, fifth, sixth and seventh **rail** sections, said method comprising the steps of supplying said **rail** sections successively and in the order named to welding apparatus where the ends of the **rail** sections are welded together, passing the welded joints through a flash removing station where at least a portion of the excess flash metal around each joint is removed, passing the welded **rail** to a testing station, testing the weld at the latter station, the above steps being so carried out that

the weld between the first and second sections is tested while the third and fourth sections are being welded together, the weld between the third and fourth sections being passed through the flash removing station as it passes from the welding apparatus to the testing station, the weld between the second and third sections being tested -while the ends of the fourth and fifth sections are being welded together and the weld between the fourth and fifth sections being passed through the flash removing station as it passes from the welding apparatus to the testing station, the weld between the fifth and sixth sections being tested while the ends of the fifth and sixth sections are being welded together, and the weld between the fifth and sixth sections being passed through the grinding station to the welding apparatus. 52. A method of forming a continuous rail from first, second, third, fourth, fifth, sixth and seventh rail sections, said method comprising the steps of supplying said rail sections successively and in the order named to welding apparatus, grinding portions of the periphery of each rail section respectively. located near its opposed ends prior to supplying the rail section to the welding apparatus, passing electric current between adjacent ends of successive rail sections by means of electrodes in the welding apparatus in engagement with the ground peripheral portions of the adjacent ends of the successive rail sections in order to weld together the ends of the rail sections and then forcing the rail sections together to form a flash upset surrounding the welded joint, passing the welded joints through a flash removing station where at least a portion of the excess flash metal around each joint is removed, passing the welded rail to a testing station, testing the weld at the latter station, the above steps being so carried out that the weld between the first and second sections is tested while the third and fourth sections are being welded together, the weld between the third and fourth sections being passed through the grinding station as it passes from the welding apparatus and the testing station, the weld between the second and third sections being tested while the ends of the fourth and fifth sections are being welded together and the weld between the fourth and fifth sections being passed through the grinding station as it passes from the welding apparatus to the testing station, the weld between the third and fourth sections being tested while the ends of the fifth and sixth sections are being welded together, and the weld between the fifth and sixth sections being passed through the grinding station as it passes from the welding apparatus to the testing station. 53. The method defined by claim 52 wherein the grinding of the peripheral portions of each rail section is, carried out while the rail section is in motion in passing to the welding apparatus.

Classifications:

International (IPC 8-9): B23K37/08 (Advanced/Invention);

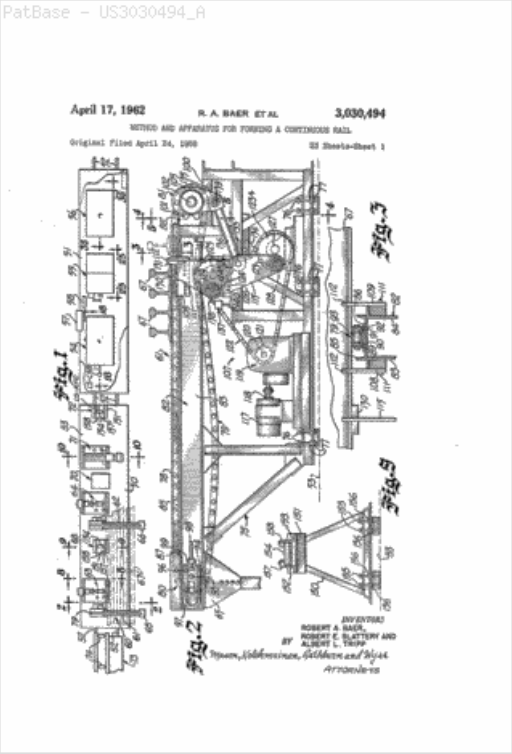
B23K37/08 (Core/Invention)

International (IPC 1-7): B23K31/09 B24B7/12

CPC: B23K37/08

European: B23K37/08

US: 219/101



Family:

Publication number	Publication date	Application number	Application date
US3030494 A	19620417	US19610112167	19610516

Priority:

US19610112167 19610516

Probable Assignee: CHEMETRON CORP

Assignee(s): (std): CHEMETRON CORP

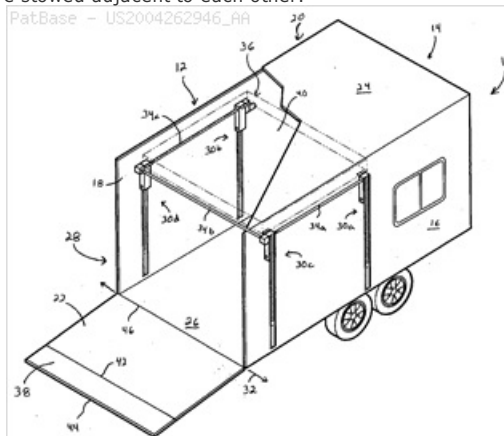
Inventor(s): (std): BAER ROBERT A ; SLATTERY ROBERT E ; TRIPP ALBERT L

Title: SYSTEM AND METHOD FOR MOVING OBJECTS

Abstract: Source: US2004262946A A structure is described which may include a bed, a cargo area which is used to receive an off-road vehicle, and superposed beds which move vertically between a first configuration where the beds are spaced apart in the cargo area and a second configuration where the beds are stowed adjacent to each other.

Classifications:

International (IPC 8-9): A47C17/165 A47C17/34 A47C17/64 A47C17/80 A47C17/84 A47C19/02 A47C19/04 A47C19/20 A47C20/04 B60N2/02 B60P1/00 B60P1/02 B60P3/07 B60P3/08 B60P3/32 B60P3/325 B60P3/34 B60P3/35 B60P3/39 B60P3/42 B60R15/00 B66B9/00 B66F1/00 B66F19/00 B66F7/02 F16M13/02 (Advanced/Invention)
International (IPC 1-7): B60P3/325 B62D25/00 B66B9/00 B66F1/00 B66F19/00 B66F7/02
CPC: B60P3/42 B60R11/00 B60R11/02 F16M13/02 A47C19/20 A47C19/202 B60P3/07 B60P3/08 B60P3/32 A47C17/84 A47C17/80 A47C19/045 A47C19/025 A47C20/041 A47C17/165 A47C17/34 B60P3/39 B60P1/02 B60P3/34
European: A47C17/84 A47C19/20 B60P1/02 B60P3/07 B60P3/08 B60P3/32 B60P3/39 B60R11/00 L60R11/02
US: 1/1 248/295.11 248/295.110S 296/156 296/156P 296/158 296/164 296/168 296/170 296/190.02 296/24.3 296/24.33 296/24.330P 296/61 296/65.01 296/65.010 296/69 312/249.1 312/319.7 312/319.8 410/26 5/10.1 5/10.2 5/118 5/37.1 5/371 5/9.1 52/29

**Family:**

Publication number	Publication date	Application number	Application date
CA2534654 AA	20060131	CA20042534654	20040731
CA2534654 C	20130108	CA20042534654	20040731
EP1654187 A2	20060510	EP20040780229	20040731
EP1654187 A4	20110629	EP20040780229	20040731
US2004262946 AA	20041230	US20040903922	20040731
US2004262947 AA	20041230	US20040916112	20040811
US2004262949 AA	20041230	US20040915984	20040811
US2005001449 AA	20050106	US20040916253	20040811
US2006091697 AA	20060504	US20050255164	20051019
US2006181110 AA	20060817	US20050255165	20051019
US2006220417 AA	20061005	US20060424852	20060616
US2006290159 AA	20061228	US20060422532	20060606
US2008238119 AA	20081002	US20080135806	20080609
US2010219660 AA	20100902	US20100779849	20100513
US2012025555 AA	20120202	US20110270046	20111010
US2013081336 AA	20130404	US20120685471	20121126
US2014159410 AA	20140612	US20140177936	20140211
US2016332552 AA	20161117	US20160191982	20160624
US2017210273 AA	20170727	US20170480349	20170405
US6983979 BB	20060110	US20040903922	20040731
US6983980 BB	20060110	US20040916253	20040811
US6988760 BB	20060124	US20040916112	20040811
US7121612 BB	20061017	US20050255164	20051019
US7121613 BA	20061017	US20060424852	20060616
US7198320 BB	20070403	US20040915984	20040811
US7350850 BB	20080401	US20050255165	20051019
US7384093 BB	20080610	US20060422532	20060606
US7744142 BB	20100629	US20080135806	20080609
US8038193 BB	20111018	US20100779849	20100513
US8336940 BB	20121225	US20110270046	20111010
US8651545 BB	20140218	US20120685471	20121126
US9380881 BB	20160705	US20140177936	20140211
WO05012156 A2	20050210	WO2004US25360	20040731
WO05012156 A3	20060119	WO2004US25360	20040731

Priority:

US20030491448P 20030731	US20030492440P 20030804	US20030510270P 20031009
US20040534092P 20040102	US20040544000P 20040212	US20040560872P 20040409
US20040903922 20040731	US20040916112 20040811	US20040915984 20040811
US20040916253 20040811	US20050255164 20051019	US20050255165 20051019
US20040621606P 20041021	US20040639676P 20041227	US20060424852 20060616
WO2004EP25360 20040731	US20110270046 20111010	US20100779849 20100513
US20080135806 20080609	US20060422532 20060606	WO2004US25360 20040731
US20120685471 20121126	US20140177936 20140211	US20140932634P 20140128
US20160191982 20160624	US20170480349 20170405	

Probable Assignee: LIPPERT COMPONENTS INC

Assignee(s): (std): HAPPIJAC CO ; HAPPIJAC COMPANY ; LIPPERT COMPONENTS INC ; RASMUSSEN C M ; RASMUSSEN C MARTIN ; RASMUSSEN MARTIN C ; RECREATION SYSTEMS INC DBA HAPPIJAC COMPANY

Assignee(s): RECREATION SYSTEMS INC DBA HAPPIJAC CO ; RECREATION SYSTEMS INC

Inventor(s): (std): RASMUSSEN C MARTIN ; RASMUSSEN MARTIN C ; RASMUSSEN C M

Inventor(s): RASMUSSEN C

Agent(s): RIDOUT AND MAYBEE LLP; FOLEY AND LARDNER; FOLEY AND LARDNER LLP; HOLLAND AND HART LLP; HOLLAND AND HART; BARNES AND THORNBURG LLP

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ
DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE
KG KP KR KZ LC LI LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NA NE NI NL NO NZ OM
PG PH PL PT RO RU SC SD SE SG SI SK SL SN SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU
ZA ZM ZW

Title: INTEGRATED SYSTEM FOR PROCESSING MICROFLUIDIC SAMPLES, AND METHOD OF USING THE SAME

Abstract: Source: US2007292941A This patent application describes an integrated apparatus for processing polynucleotide-containing samples, and for providing a diagnostic result thereon. The apparatus is configured to receive a microfluidic cartridge that contains reagents and a network for processing a sample. Also described are methods of using the apparatus.

Classifications:

International (ipc 8-9): B01D1/06 B01D11/00 B01J19/00 B01L3/00 B01L3/02 B01L3/14 B01L7/00 B01L9/00 B01L9/06 B01L99/00 B03C1/00 B03C1/06 B03C1/30 B05D5/00 B05D7/22 B81B1/00 B81B7/02 C07H1/00 C07H1/08 C07H21/00 C12M1/00 C12M1/02 C12M1/24 C12M1/26 C12M1/34 C12M1/36 C12M1/38 C12M1/40 C12M1/42 C12M3/00 C12N15/00 C12N15/09 C12N15/10 C12P19/34 C12Q1/68 F16K99/00 G01N1/00 G01N1/40 G01N21/00 G01N21/64 G01N21/78 G01N33/48 G01N33/544 G01N35/00 G01N35/02 G01N35/04 G01N35/08 G01N35/10 G01N37/00 G01T1/16 H05B3/00 H05B3/02 (Advanced/Invention); B01L3/00 B01L7/00 B03C1/12 B03C1/28 B81B3/00 B81B5/00 C12Q1/68 G01N21/64 G01N35/00 G01N35/04 G01N35/10 (Advanced/Non-invention); B01D1/00 B01J19/00 B01L3/00 B01L3/02 B01L3/14 B01L7/00 B01L9/00 B03C1/02 B05D5/00 B05D7/22 C07H1/00 C12M1/00 C12M1/34 C12M1/40 C12M3/00 C12N15/10 C12P19/00 C12Q1/68 F16K99/00 G01N21/00 G01N33/48 G01N33/544 G01N35/08 G01N37/00 G01T1/00 (Core/Invention)

International (ipc 1-7): C12M1/00

CPC: B01L3/5082 B01L2200/026 B01L2300/0851 B01L2400/0406 C12N15/1013 C07H1/08 Y10S435/808 C12Q2565/629 B01L2200/025 B01L2300/022 B01L2300/046 B01L2300/0861 B01L2300/1838 G01N21/6428 G01N2021/6419 B01L2300/14 B01L2400/0694 C12Q1/6806 B01L3/5085 G01N2035/103 B01L9/06 G01N2035/00772 G01N2035/00801 G01N2035/0493 B01L2300/045 G01N35/026 G01N2035/0425 C12Q1/6813 B01L2300/1805 B01L3/502707 B01L3/50273 B01L2300/18 B01L2300/06 B01L3/021 B01L2200/143 G01N2035/0436 H05B3/0014 H05B3/22 B01L3/502723 B01L3/502738 B01L2200/027 B01L2200/0684 B01L2200/10 B01L2300/0681 B01L2300/0803 B01L2300/0816 B01L2300/0867 B01L2300/087 B01L2300/0887 B01L2400/0442 B01L2400/0481 B01L2400/0487 B01L2400/0611 B01L2400/0677 B01L2400/0683 F16K99/0019 B01L3/502761 B01L3/52 B01L3/0275 B01L2300/0832 B01L2300/165 B01L2200/12 B01L2300/0627 B01L2200/14 B01L2300/0636 B01L2300/0809 B01L2300/1894 B01L3/502715 C12N15/1003 G01N35/0099 G01N35/1002 B01L3/5027 B01L7/52 B01L9/527 B01L2200/147 B01L2200/148 B01L2200/16 B01L2300/021 B01L2300/1822 B01L2300/1827 B01L2300/1861 B03C1/06 B03C1/12 B03C1/288 F16K99/003 F16K99/0032 F16K99/0044 F16K99/0061 F16K2099/0084 G01N35/0098 G01N2035/00881 G01N35/00584 G01N35/1065 F16K99/0001 C12Q1/686 G01N2021/6421 G01N2021/6441 B01L3/5025 B01L2200/142 B01L2300/1844 F16K2099/008

European: B01L3/00C6D B01L3/00C6M B01L3/00C6M10 B01L3/00C6M2 B01L3/00C6M6 B01L3/00C6M8 B01L3/02C B01L3/14 B01L3/5025 B01L3/5027 B01L3/5027A B01L3/5027B B01L3/5027C B01L3/5027D B01L3/5027E B01L3/5082 B01L7/52 B01L9/06 B01L9/527 C12Q1/68B C12Q1/68D4 F16K99/00M F16K99/00M2G F16K99/00M2M F16K99/00M2N F16K99/00M4C2 F16K99/00M4D6 G01N21/64H G01N35/00M G01N35/02E G01N35/10M H05B3/22 L01L200/02C L01L200/02D L01L200/06M L01L200/10 L01L200/14B L01L200/14C L01L200/14D L01L200/16 L01L3/5025 L01L3/5027 L01L3/5027B L01L3/5027C L01L3/5027E L01L3/5085 L01L300/02A L01L300/02A2 L01L300/04A8 L01L300/04B L01L300/06D L01L300/08A L01L300/08B4 L01L300/08D2 L01L300/08E L01L300/08E4 L01L300/08E6 L01L300/08F L01L300/14 L01L300/18A L01L300/18A6 L01L300/18A8 L01L300/18C L01L300/18C2 L01L300/18E L01L400/04F12 L01L400/04F2 L01L400/04M4 L01L400/04M8 L01L400/06C2 L01L400/06P L01L400/06P2 L01L400/06V L01L7/52 L01L9/06 R16K99/00P8 R16K99/00Y2 S01N21/64G2 S01N35/00G3C1P S01N35/00G3C2A S01N35/00G3L1 S01N35/02E S01N35/04A3 S01N35/04A4C S01N35/04A6D S01N35/04D9B S01N35/10F1

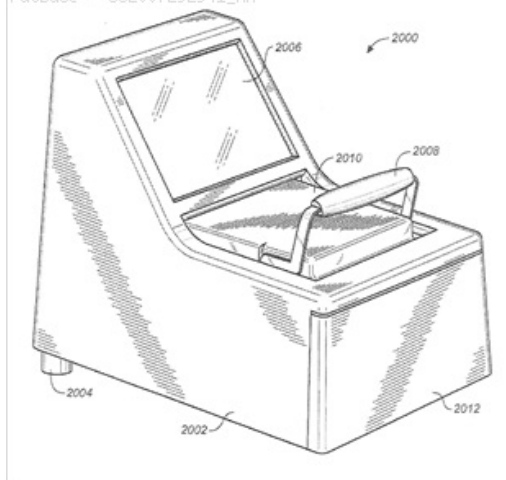
US: 1/1 209/11 209/11P 209/39 209/39S 209/552 209/555 211/194 211/60.1 211/74 219/538 219/539 222/1 222/204 222/52 222/55 222/56 222/71 250/366 250/366P 422/100 422/100S 422/102 422/102P 422/104 422/104P 422/129 422/129S 422/400 422/400P 422/400S 422/401 422/50 422/500 422/501 422/502 422/509 422/511 422/519 422/537 422/547 422/549 422/549P 422/550 422/561 422/562 422/61 422/65 422/65P 422/68.1 422/68.100S 422/81 422/913 422/914 422/915 422/916 422/917 427/230 427/230S 427/256 427/256S 427/421.1 427/427.7 435/283.1 435/287.1 435/287.100 435/287.100S 435/287.2 435/287.200P 435/287.200S 435/287.3 435/288.2 435/288.3 435/288.5 435/288.7 435/288.700 435/288.700P 435/289.1 435/289.100S 435/303.1 435/303.100S 435/5 435/6 435/6.1 435/6.11 435/6.12 435/6.120P 435/808 435/91.1 435/91.2 435/91.200P 435/91.200S 506/23 506/26 506/39 506/9 536/25.4 536/25.400P 536/25.41 536/25.42 D24/225 D24/227

Locarno class: 24/01 24/02

Family:

Publication number	Publication date	Application number	Application date
AU2008276211 AA	20090122	AU20080276211	20080711
AU2008276211 BB	20150122	AU20080276211	20080711
AU2008317492 AA	20090430	AU20080317492	20080714
AU2008317492 BB	20140130	AU20080317492	20080714
AU2013203499 AA	20130502	AU20130203499	20130410
AU2013203499 BB	20160303	AU20130203499	20130410
AU2013205252 AA	20130502	AU20130205252	20130410
AU2013205252 AH	20151022	AU20130205252	20130410
AU2013205252 BB	20150507	AU20130205252	20130410
AU2013205252 BH	20151022	AU20130205252	20130410
AU2013205253 AA	20130502	AU20130205253	20130410
AU2013205253 AH	20151022	AU20130205253	20130410
AU2013205253 BB	20150702	AU20130205253	20130410
AU2013205253 BH	20151022	AU20130205253	20130410
AU2013205254 AA	20130502	AU20130205254	20130410
AU2013205254 AH	20151029	AU20130205254	20130410
AU2013205254 BB	20150423	AU20130205254	20130410
AU2013205254 BH	20151029	AU20130205254	20130410
AU2013205255 AA	20130502	AU20130205255	20130410
AU2013205255 AH	20151029	AU20130205255	20130410
AU2013205255 BB	20150730	AU20130205255	20130410
AU2013205255 BH	20151029	AU20130205255	20130410
AU2013205255 CA	20160218	AU20130205255	20130410
AU2013205256 AA	20130502	AU20130205256	20130410

PatBase - US2007292941_AA



AU2013205256 AH	20151022	AU20130205256	20130410
AU2013205256 BB	20150730	AU20130205256	20130410
AU2013205256 BH	20151022	AU20130205256	20130410
AU2013205258 AA	20130502	AU20130205258	20130410
AU2013205258 AH	20151029	AU20130205258	20130410
AU2013205258 BB	20150507	AU20130205258	20130410
AU2013205258 BH	20151029	AU20130205258	20130410
AU2013205266 AA	20130502	AU20130205266	20130410
AU2013205266 BB	20150611	AU20130205266	20130410
AU2013205267 AA	20130502	AU20130205267	20130410
AU2013205267 BB	20150813	AU20130205267	20130410
AU2013205268 AA	20130502	AU20130205268	20130410
AU2013205268 BB	20150319	AU20130205268	20130410
AU2015203374 AA	20150709	AU20150203374	20150619
AU2015203374 BB	20170420	AU20150203374	20150619
AU2015210345 AA	20150827	AU20150210345	20150804
AU2015210345 BB	20170921	AU20150210345	20150804
AU2015210375 AA	20150903	AU20150210375	20150805
AU2015210375 BB	20170420	AU20150210375	20150805
AU2015230801 AA	20151015	AU20150230801	20150925
AU2015234322 AA	20151022	AU20150234322	20150930
AU2015234322 BB	20171012	AU20150234322	20150930
AU2015249160 AA	20151119	AU20150249160	20151030
AU2015249160 BB	20171012	AU20150249160	20151030
AU2016203610 AA	20160616	AU20160203610	20160531
AU2016203610 BB	20180125	AU20160203610	20160531
CA2693654 AA	20100111	CA20082693654	20080711
CA2698253 AA	20100112	CA20082698253	20080714
CN101802164 A	20100811	CN200880106760	20080714
CN101802164 B	20131106	CN200880106760	20080714
CN103695291 A	20140402	CN201310456179	20080714
CN103695291 B	20170829	CN201310456179	20080714
CN103695292 A	20140402	CN201310459896	20080714
CN103695292 B	20170412	CN201310459896	20080714
CN103695302 A	20140402	CN201310455986	20080714
CN103695302 B	20160525	CN201310455986	20080714
CN103695307 A	20140402	CN201310456052	20080714
CN103695307 B	20160120	CN201310456052	20080714
CN103695310 A	20140402	CN201310455322	20080714
CN103725592 A	20140416	CN201310455954	20080714
CN103725592 B	20170524	CN201310455954	20080714
CN103725603 A	20140416	CN201310455967	20080714
CN103725603 B	20170623	CN201310455967	20080714
CN103740588 A	20140423	CN201310456193	20080714
CN103740588 B	20160817	CN201310456193	20080714
CN103756867 A	20140430	CN201310455953	20080714
CN105441312 A	20160330	CN201510994207	20080714
CN107233943 A	20171010	CN201710406173	20080714
DK2001990 T3	20161003	DK20070754084T	20070326
DK2179025 T3	20170123	DK20080843060T	20080714
EP2001990 A2	20081217	EP20070754084	20070326
EP2001990 A4	20110720	EP20070754084	20070326
EP2001990 B1	20160629	EP20070754084	20070326
EP2091647 A2	20090826	EP20070862065	20071114
EP2171460 A1	20100407	EP20080826342	20080711
EP2171460 A4	20100908	EP20080826342	20080711
EP2171460 B1	20170830	EP20080826342	20080711
EP2179025 A2	20100428	EP20080843060	20080714
EP2179025 A4	20120815	EP20080843060	20080714
EP2179025 B1	20161005	EP20080843060	20080714
EP3088083 A1	20161102	EP20160174452	20070326
EP3144065 A1	20170322	EP20160191793	20080714
EP3178558 A2	20170614	EP20160191773	20080714
EP3178558 A3	20171025	EP20160191773	20080714
EP3178559 A1	20170614	EP20160191787	20080714
EP3222733 A1	20170927	EP20170168296	20080711
ES2587007 T3	20161020	ES20070754084T	20070326
ES2610128 T3	20170426	ES20080843060T	20080714
ES2648798 T3	20180108	ES20080826342T	20080711
IN00525DN2010 A	20100730	IN2010DN00525	20100125
JP2009531064 T2	20090903	JP20090502930T	20070326
JP2010533490 T2	20101028	JP20100517005T	20080714
JP2010533493 T2	20101028	JP20100517091T	20080711
JP2012055321 A2	20120322	JP20110275368	20111216
JP2013150634 A2	20130808	JP20130094624	20130426
JP2013167639 A2	20130829	JP20130094651	20130426
JP2013167640 A2	20130829	JP20130094683	20130426
JP2013167641 A2	20130829	JP20130094696	20130426
JP2013172726 A2	20130905	JP20130094347	20130426
JP2013172727 A2	20130905	JP20130094481	20130426
JP2013172728 A2	20130905	JP20130094482	20130426

JP2013172729 A2	20130905	JP20130094538	20130426
JP2013172730 A2	20130905	JP20130094602	20130426
JP2013255517 A2	20131226	JP20130182355	20130903
JP2014097080 A2	20140529	JP20140043807	20140306
JP2015133995 A2	20150727	JP20150095471	20150508
JP2016000054 A2	20160107	JP20150188566	20150925
JP2016013135 A2	20160128	JP20150191869	20150929
JP2016130745 A2	20160721	JP20160087317	20160425
JP2016135159 A2	20160728	JP20160093310	20160506
JP2016136969 A2	20160804	JP20160085479	20160421
JP2016154559 A2	20160901	JP20160086245	20160422
JP2017060501 A2	20170330	JP20160226707	20161122
JP2017151123 A2	20170831	JP20170106562	20170530
JP5261485 B2	20130814	JP20100517005T	20080714
JP5415253 B2	20140212	JP20090502930T	20070326
JP5651011 B2	20150107	JP20100517091T	20080711
JP5746740 B2	20150708	JP20130182355	20130903
JP5844770 B2	20160120	JP20130094683	20130426
JP5858950 B2	20160210	JP20130094696	20130426
JP5922612 B2	20160524	JP20130094347	20130426
JP5927141 B2	20160525	JP20130094481	20130426
JP5934140 B2	20160615	JP20130094651	20130426
JP5950862 B2	20160713	JP20130094482	20130426
JP5981473 B2	20160831	JP20140043807	20140306
JP6006161 B2	20161012	JP20130094538	20130426
JP6016708 B2	20161026	JP20130094624	20130426
JP6049802 B2	20161221	JP20150095471	20150508
JP6265581 B2	20180124	JP20110275368	20111216
JP6267169 B2	20180124	JP20150188566	20150925
JP6272938 B2	20180131	JP20160085479	20160421
US2007292941 AA	20071220	US20070728964	20070326
US2008149840 AA	20080626	US20070940321	20071114
US2008160601 AA	20080703	US20070940315	20071114
US2008182301 AA	20080731	US20070985577	20071114
US2009047713 AA	20090219	US20070940310	20071114
US2009129978 AA	20090521	US20080218416	20080714
US2009130719 AA	20090521	US20080239537	20080926
US2009130745 AA	20090521	US20080173023	20080714
US2009131650 AA	20090521	US20080172214	20080711
US2009134069 AA	20090528	US20080178586	20080723
US2009136385 AA	20090528	US20080178557	20080723
US2009136386 AA	20090528	US20080178584	20080723
US2009155123 AA	20090618	US20080212403	20080917
US2009221059 AA	20090903	US20080218498	20080714
US2010173393 AA	20100708	US20070515003	20071114
US2011027151 AA	20110203	US20100904901	20101014
US2011207140 AA	20110825	US20110035725	20110225
US2011210257 A9	20110901	US20070940321	20071114
US2012122108 AA	20120517	US20120358441	20120125
US2012160826 AA	20120628	US20110341477	20111230
US2012171759 AA	20120705	US20120417108	20120309
US2012258463 AA	20121011	US20120474980	20120518
US2013037564 AA	20130214	US20120652368	20121015
US2013096292 AA	20130418	US20120692980	20121203
US2013101990 AA	20130425	US20120692929	20121203
US2013288358 AA	20131031	US20130857529	20130405
US2014323357 AA	20141030	US20140263208	20140428
US2014323711 AA	20141030	US20140262525	20140425
US2015064702 AA	20150305	US20140318160	20140627
US2015133345 AA	20150514	US20140537517	20141110
US2015315631 AA	20151105	US20150796239	20150710
US2015328638 AA	20151119	US20150719692	20150522
US2016096178 A9	20160407	US20110341477	20111230
US2016102305 AA	20160414	US20150976746	20151221
US2016250635 AA	20160901	US20160996670	20160115
US2016250640 AA	20160901	US20150941087	20151113
US2016333337 AA	20161117	US20160017977	20160208
US2017097373 AA	20170406	US20160160186	20160520
US2018017184 AA	20180118	US20170482572	20170407
US7897368 BB	20110301	US20070985577	20071114
US7998708 BB	20110816	US20070985577	20071114
US8088616 BB	20120103	US20070940315	20071114
US8105783 BB	20120131	US20080239537	20080926
US8133671 BB	20120313	US20080173023	20080714
US8182763 BB	20120522	US20080178584	20080723
US8216530 BB	20120710	US20100904901	20101014
US8287820 BB	20121016	US20080212403	20080917
US8323900 BB	20121204	US20110035725	20110225
US8324372 BB	20121204	US20080172214	20080711
US8415103 BB	20130409	US20120358441	20120125
US8709787 BB	20140429	US20070940310	20071114

US8769376 BB	20140729	US20070940321	20071114
US8883490 BB	20141111	US20070728964	20070326
US9040288 BB	20150526	US20120692929	20121203
US9080207 BB	20150714	US20080218498	20080714
US9186677 BB	20151117	US20140262525	20140425
US9217143 BB	20151222	US20130857529	20130405
US9238223 BB	20160119	US20120417108	20120309
US9259734 BB	20160216	US20120652368	20121015
US9347586 BB	20160524	US20080178586	20080723
US9618139 BB	20170411	US20080218416	20080714
US9701957 BB	20170711	US20140537517	20141110
US9802199 BB	20171031	US20140263208	20140428
US9815057 BB	20171114		
USD621060 S1	20100803	US20080308920F	20080714
USD669191 S1	20121016	US20100366683F	20100728
USD787087 S1	20170516	US20160554066F	20160208
WO07112114 A2	20071004	WO2007US07513	20070326
WO07112114 A3	20080703	WO2007US07513	20070326
WO08060604 A2	20080522	WO2007US24022	20071114
WO08060604 A3	20090219	WO2007US24022	20071114
WO08061165 A2	20080522	WO2007US84730	20071114
WO08061165 A3	20081030	WO2007US84730	20071114
WO09012185 A1	20090122	WO2008US69897	20080711
WO09012185 A9	20090416	WO2008US69897	20080711
WO09054870 A2	20090430	WO2008US08640	20080714
WO09054870 A3	20090820	WO2008US08640	20080714

Priority:

AU20080276211	20080711	AU20080317492	20080714	AU20130203499	20130410
AU20130205253	20130410	AU20130205254	20130410	AU20130205252	20130410
AU20130205255	20130410	AU20130205258	20130410	AU20130205266	20130410
AU20130205267	20130410	AU20130205268	20130410	AU20130205256	20130410
AU20150203374	20150619	AU20150210345	20150804	JP20090502930	20070326
JP20100517005	20080714	JP20100517091	20080711	JP20110275368	20070326
AU20150210375	20150805	JP20100517005T	20080714	AU20150230801	20150925
AU20150234322	20150930	JP20090502930T	20070326	AU20150249160	20151030
CN200880106760	20080714	AU20160203610	20160531	JP20130094481	20080714
EP20070754084	20070326	EP20080843060	20080714	EP20080826342	20080711
US20070728964	20070326	US20070940321	20071114	US20070940315	20071114
US20070985577	20071114	US20070940310	20071114	US20080172214	20080711
US20070308920F	20080714	US20080178586	20080723	US20080178557	20080723
US20080178584	20080723	US20070515003	20071114	US20060786007P	20060324
US20060859284P	20061114	US20080212403	20080917	US20080173023	20080714
US20070959437P	20070713	JP20130182355	20080711	JP20150095471	20150508
US20060580267	20061011	JP20130094696	20080714	JP20130094482	20080714
JP20130094651	20080714	JP20130094538	20080714	JP20140043807	20070326
JP20160087317	20160425	JP20160093310	20160506	JP20160085479	20160421
JP20160086245	20160422	JP20150095471	20080711	JP20160226707	20161122
JP20150191869	20080714	JP20170106562	20170530	WO2007US07513	20070326
US20080218416	20080714	US20080239537	20080926	US20080308920F	20080714
WO2007US24022	20071114	WO2008US08640	20080714	WO2008US69897	20080711
WO2007US84730	20071114	US20100904901	20101014	US20110035725	20110225
US20120358441	20120125	US20110341477	20111230	US20120417108	20120309
US20120474980	20120518	US20100366683F	20100728	US20120692980	20121203
US20120692929	20121203	US20120652368	20121015	US20080218498	20080714
US20130857529	20130405	US20140263208	20140428	US20140262525	20140425
US20140318160	20140627	US20100515003	20100317	US20140537517	20141110
US20150796239	20150710	US20150719692	20150522	US20150976746	20151221
US20150941087	20151113	US20160996670	20160115	US20160017977	20160208
US20160160186	20160520	US20160554066F	20160208	US20170482572	20170407

Probable Assignee: HANDYLAB INC

Assignee(s): (std): BOUTT ELIZABETH ; BRAHMASANDRA SUNDARESH N ; CRAIG ELIZABETH ; DUFFY PATRICK ; GANESAN KARTHIK ; PARUNAK GENE ; HANDIQUE KALYAN ; HANDYLAB INC ; HALEY CECELIA ; HANDY LAB INC ; WILLIAMS JEFF ; PHADKE NIKHIL ; WU BETTY ; WILSON KERRY ; SPRINGER THEODORE

Assignee(s): VENTURE LENDING AND LEASING IV INC ; VENTURE LENDING AND LEASING V INC

Inventor(s): (std): BOUTT ELIZABETH ; BRAHMASANDRA SUNDARESH N ; CRAIG ELIZAETH ; GANESAN KARTHIK ; HANDIQUE KALYAN ; PARUNAK GENE ; PHADKE NIKHIL ; WILLIAMS JEFF ; WU BETTY ; WILSON KERRY ; SPRINGER THEODORE ; HALEY CECELIA ; DUFFY PATRICK ; CRAIG ELIZABETH ; KERRY WILSON ; KALYAN HANDIQUE ; JEFF WILLIAMS ; KELLY WILSON ; CALIAN HAN DICK

Inventor(s): SUNDARESH N BRAHMASANDRA ; ELIZABETH BOUTT ; BRAHMASANDRA SUNDARESH

Agent(s): DAVIES COLLISON CAVE; FB RICE PTY LTD; FB RICE; AIRD AND MCBURNEY LP; HOWE STEVEN; MUMMERY THOMAS ZACK; UNGRIA JAVIER; SALVA JOAN; OHTSUKA SUMIE; CHIBA AKIO; ONO SHINJIRO; SHAMOTO ICHIO; TOMITA HIROYUKI; KOBAYASHI YASUSHI; INO SARI; KURASAWA ICHIRO; MATSUSHITA MITSURU; DESHIMARU TAKESHI; KUMAKURA YOSHIO; YAMASAKI KAZUO; TAKIZAWA TOSHIO; HAKODA ATSUSHI; ASAI KENJI; NISHIJIMA TAKAKI; WATANABE TORU; YAMAMOTO OSAMU; TAKEUCHI SHIGEO; HATTORI HIRONOBU; ICHIKAWA SATSUKI; FISH AND RICHARDSON PC; KNOBBE MARTENS OLSON AND BEAR LLP; BONE RICHARD G A; BONE RICHARD GA

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: SURGICAL FASTENER WITH PREDETERMINED RESORPTION RATE

Abstract: Source: US2005267478A A resorbable screw fastener and a method of firing with an applicator capable of applying a surgical fastener to tissue in order to form tissue connection to secure objects to tissue, the fastener including a body portion having a **helical** thread, a head portion disposed at the proximal end of the body portion. The resorbable screw fastener is 100 percent resorbed in vivo during a period of time ranging from about 14 days to about one year after implantation.

Classifications:

International (IPC 8-9): A61B17/00 A61B17/03 A61B17/04 A61B17/064 A61B17/068 A61B17/08 A61B17/10 A61B17/56 A61B17/58 A61B17/64 A61B17/68 A61B17/86 A61B17/88 A61F2/08 A61L27/14 A61L27/58 A61L31/00 A61L31/04 A61L31/06 A61L31/14 B25B13/48 B25B17/00 B25B23/06 B25B23/10 C08L67/04 (Advanced/Invention); A61B17/00 A61B17/064 A61B17/08 A61F2/00 (Advanced/Non-invention); A61L (Subclass/Invention)

International (IPC 1-7): A61B17/56 A61B17/86

CPC: A61B17/864 A61B17/8891 A61L31/148 C08L67/04 A61B17/08 A61B17/8635 A61B17/866 A61B17/869 A61B17/8883

A61B2017/00004 A61B2017/0648 A61L31/06 B25B13/481

B25B17/00 B25B23/065 B25B23/101 Y10S606/916 A61B17/861

A61B17/8625 A61B17/0401 A61B2017/0409 A61B2017/0441

A61B17/068 A61F2/0063 A61F2220/0016 A61B17/064 A61B17/862

European: A61B17/86A A61B17/86A2P A61B17/86B4 A61B17/86M

A61B17/88S A61B17/88S2P A61B17/88S4P A61L31/06 A61L31/14K

B25B13/48B B25B17/00 B25B23/06B B25B23/10B K61B17/00A

K61B17/064 K61B17/064T2 K61B17/08 K61B17/86A2 K61B17/86D

K61B17/86T

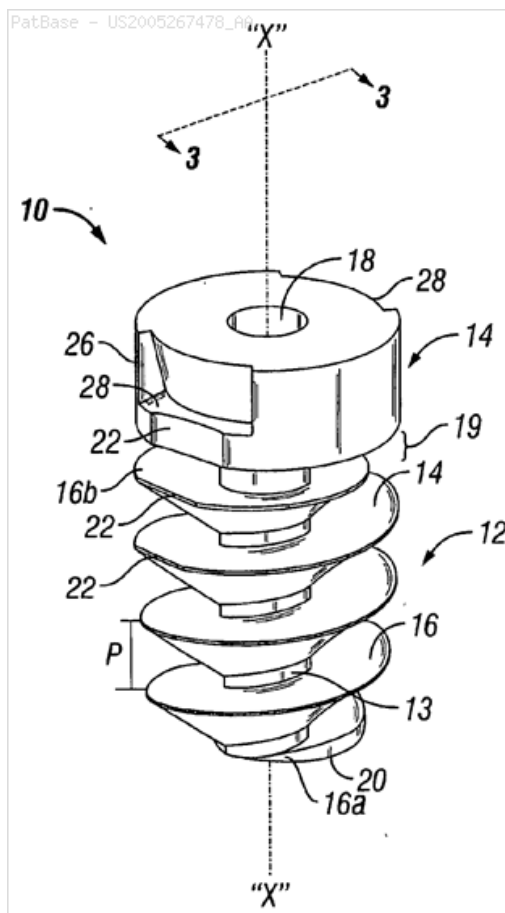
US: 1/1 227/175.1 606/104 606/104S 606/139 606/213 606/300

606/304 606/304S 606/305 606/305P 606/308 606/308S 606/311

606/312 606/312S 606/314 606/314S 606/318 606/318S 606/331

606/331S 606/73 606/908 606/908S 606/910 606/910S 606/916

606/916P



Family:

Publication number	Publication date	Application number	Application date
AU2004249161 AA	20041229	AU20040249161	20040614
AU2004249161 BB	20091210	AU20040249161	20040614
AU2004249161 BI	20100408	AU20040249161	20040614
AU2006201521 AA	20061109	AU20060201521	20060411
CA2527778 AA	20051130	CA20042527778	20040614
CA2527778 C	20111108	CA20042527778	20040614
CA2544359 AA	20061025	CA20062544359	20060420
DE602004033887 D1	20111006	DE200460033887T	20040614
DE602004043000 D1	20131002	DE200460043000T	20040614
DE602004045928 D1	20141113	DE200460045928T	20040614
DE602006044409 D1	20150312	DE200660044409T	20060421
EP1635723 A2	20060322	EP20040755078	20040614
EP1635723 A4	20080730	EP20040755078	20040614
EP1635723 B1	20110810	EP20040755078	20040614
EP1716874 A2	20061102	EP20060008305	20060421
EP1716874 A3	20061227	EP20060008305	20060421
EP1716874 B1	20150128	EP20060008305	20060421
EP2298184 A1	20110323	EP20100012659	20040614
EP2308404 A1	20110413	EP20100183492	20040614
EP2308404 B1	20141001	EP20100183492	20040614
EP2314241 A1	20110427	EP20100012646	20040614
EP2314241 B1	20130807	EP20100012646	20040614
EP2893943 A1	20150715	EP20140197885	20060421
ES2370246 T3	20111213	ES20040755078T	20040614
JP2006305348 A2	20061109	JP20060116189	20060419
JP2007268291 A2	20071018	JP20070136038	20070522
JP2007500583 T2	20070118	JP20060533751T	20040614
JP2011101814 A2	20110526	JP20110013505	20110125
JP4914291 B2	20120411	JP20070136038	20070522
US2005267478 AA	20051201	US20050113879	20050425
US2006241622 AA	20061026	US20040560879	20040614
US2010191294 AA	20100729	US20100706159	20100216

US2011282401 AA	20111117	US20110190669	20110726
US2013018392 AA	20130117	US20120623373	20120920
US2013197591 AA	20130801	US20130799298	20130313
US2014114329 AA	20140424	US20130138636	20131223
US2014371765 AA	20141218	US20140472822	20140829
US2016066971 AA	20160310	US20150942554	20151116
US2016135807 AA	20160519	US20160005153	20160125
US2016270778 AA	20160922	US20160171207	20160602
US7670362 BB	20100302	US20040560879	20040614
US8002811 BB	20110823	US20050113879	20050425
US8292933 BB	20121023	US20100706159	20100216
US8414627 BB	20130409	US20110190669	20110726
US8821557 BB	20140902	US20130799298	20130313
US9186138 BB	20151117	US20140472822	20140829
US9259221 BB	20160216	US20120623373	20120920
US9364274 BB	20160614	US20130138636	20131223
US9662106 BB	20170530	US20150942554	20151116
US9788833 BB	20171017	US20160005153	20160125
WO04112841 A2	20041229	WO2004US18702	20040614
WO04112841 A3	20050728	WO2004US18702	20040614

Priority:

CA20062544359	20060420	EP20040755078	20040614	JP20060533751	20040614
EP20060008305	20060421	EP20100183492	20040614	EP20100012646	20040614
US20040560879	20040614	US20050113879	20050425	US20030478352P	20030613
US20110190669	20110726	US20100706159	20100216	US20120623373	20120920
US20060560879	20060510	US20130138636	20131223	WO2004US18702	20040614
US20130799298	20130313	US20140472822	20140829	US20150942554	20151116
US20160005153	20160125	US20160171207	20160602		

Probable Assignee: COVIDIEN LP

Assignee(s): (std): CORRADI RALPH R ; CORRADI RALPH ROBERT ; COVIDIEN LP ; U S SURGICAL A DIVISION OF TYC ; FOWLER DAVID N ; CRISCUOLO CHRISTOPHER J ; TYCO HEALTHCARE GROUP LP ; TYCO HEALTHCARE ; TYCO HEALTHCARE GROUP LLP ; FOWLER DAVID ; BETTUCHI MICHAEL ; ZERGIEBEL EARL M ; ZERGIEBEL EARL ; VIOLA FRANK J

Assignee(s): U S SURGICAL A DIVISION OF TYCO HEALTHCARE GROUP L ; U S SURGICAL A DIVISION OF TYCO HEALTHCARE GROUP LP ; US SURGICAL A DIVISION OF TYCO HEALTHCARE GROUP LP ; BUTTUCHI MICHAEL ; TYCO HEALTHCRE GROUP LP ; COVIDIEN LP MANSFIELD ; TYCO HEALTHCARE GROUP LP NEW HAVEN ; US SURGICAL A DIVISION OF TYCO HEALTHCARE

Inventor(s): (std): TYCO HEALTHCARE GROUP LP ; FOWLER DAVID ; ZERGIEBEL EARL M ; ZERGIEBEL EARL ; VIOLA FRANK J ; FOWLER DAVID N ; CRISCUOLO CHRISTOPHER J ; CORRADI RALPH R ; BETTUCHI MICHAEL ; CORRADI RALPH ROBERT ; BUTTUCHI MICHAEL

Inventor(s): BETTUCHI MICHAEL MIDDLETOWN ; EARL M ZERGIEBEL ; ZERGIEBEL EARL M GUILFORD ; ZERGIEBEL EARL GUILFORD ; VIOLA FRANK J SANDY HOOK ; VIOLA FRANK ; EARL ZERGIEBEL ; DAVID N FOWLER ; CRISCUOLO CHRISTOPHER J BRANDFORD ; CRISCUOLO CHRISTOPHER ; CORRADI RALPH ROBERT GUILFORD ; CORRADI RALPH ; CHRISTOPHER J CRISCUOLO ; RALPH ROBERT CORRADI ; MICHAEL BETTUCHI ; FRANK J VIOLA ; FOWLER DAVID N CHESHIRE

Agent(s): SPRUSON AND FERGUSON; MCFADDEN FINCHAM; OSLER HOSKIN AND HARCOURT LLP; HOFFMANN EITLE PATENT U RECHTSANWAELTE PARTMBB; HOFFMANN EITLE; MASCHIO ANTONIO; SOAMES CANDIDA JANE; UNITED STATES SURGICAL , A DIVISION OF TYCO HEALTHCARE GROUP LP; UNITED STATES SURGICAL A DIVISION OF TYCO HEALTHCARE GROUP LP; TYCO HEALTHCARE GROUP LP

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KZ LC LI LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NA NE NI NL NO NZ OM PG PH PL PT RO RU SC SD SE SG SI SK SL SN SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

Title: **Rail** fastening assemblies

Abstract: Source: US4442973A A rotatable or twist-on **rail** fastening assembly for securing a railway **rail** to an **anchoring** support therefor is comprised of a generally S-shaped torsional spring **rail** clip and a post-type mounting or chair adapted to cooperate therewith. The **rail** clip includes a central leg, a tie **anchor** portion and a **rail** bearing portion comprising a pair of loops spaced on opposite sides and extending from opposite ends thereof, each of the loops including an arcuate and a terminal leg. The chair is adapted to have the one loop of the S-shaped clip rotated around the post.

Classifications:

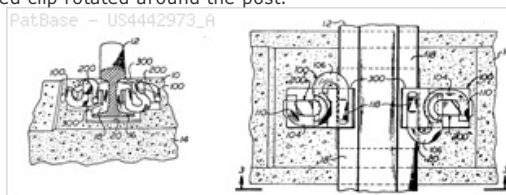
International (IPC 8-9): E01B9/02 E01B9/12 E01B9/30 E01B9/34 E01B9/48 (Advanced/Invention);
E01B9/00 (Core/Invention);
E01B F16B (Subclass/Invention)

International (IPC 1-7): E01B9/00 E01B9/02 E01B9/12 E01B9/16 E01B9/28 E01B9/30 E01B9/34 E01B9/38 E01B9/48 F16B

CPC: E01B9/12 E01B9/303 E01B9/483

European: E01B9/12 E01B9/30B E01B9/48B

US: 238/338 238/349



Family:

Publication number	Publication date	Application number	Application date
AR223346 A1	19810814	AR19790277569	19790802
AT5982 E	19840215	AT19790301531T	19790731
BR7902932 A	19800318	BR19790002932	19790514
BR7902934 A	19800318	BR19790002934	19790514
BR8203022 A	19830510	BR19820003022	19820525
CA1148913 A1	19830628	CA19790328562	19790529
CA1159805 A1	19840103	CA19800356231	19800715
CA1182086 A1	19850205	CA19790427351	19790529
CA1182086 A2	19850205	CA19830427351	19830503
CA1203788 A1	19860429	CA19820403253	19820519
CA1206939 A1	19860702	CA19790467280	19790529
CA1206939 A2	19860701	CA19840467280	19841107
DE2966577 D1	19840301	DE19792966577	19790731
DE3270220 D1	19860507	DE19823270220	19820521
EP0007813 A1	19800206	EP19790301531	19790731
EP0007813 B1	19840125	EP19790301531	19790731
EP0066995 A2	19821215	EP19820302625	19820521
EP0066995 A3	19831005	EP19820302625	19820521
EP0066995 B1	19860402	EP19820302625	19820521
IN152851 A	19840421	IN1979DE00545	19790730
JP55020900 A2	19800214	JP19790099074	19790802
JP57209301 A2	19821222	JP19820089587	19820526
MX148362 A	19830414	MX19790178742	19790801
MX159898 A	19890928	MX19820192852	19820525
US4442973 A	19840417	US19810228804	19810127
US4625912 A	19861202	US19810262710	19810511
US4715534 A	19871229	US19860858094	19860430
US4953787 A	19900904	US19880260479	19881020
ZA7901950 A	19800528	ZA19790001950	19790424
ZA7901951 A	19800528	ZA19790001951	19790424

Priority:

CA19790328562 19790529	CA19790427351 19790529	CA19830427351 19830503
CA19790467280 19790529	CA19820403253 19820519	CA19800356231 19800715
US19810240411 19810304	US19810228804 19810127	US19780933630 19780814
CA19840467280 19841107	EP19790301531 19790731	US19810262710 19810511
US19790057823 19790716	US19780930232 19780802	US19860858094 19860430
US19810266928 19810526		

Probable Assignee: CHEMETRON RAILWAY PRODUCTS INC A CORP OF DE

Assignee(s): (std): CHEMETRON RAILWAY PROD ; TRUE TEMPER RAILWAY APPLIANCES ; TORUUTEMUPAA REIRUUEI APURAIAN ; TRUE TEMPER CORP

Assignee(s): TORUUTEMUPAA REIRUUEI APURAIANSHIZU INC ; HARRIS TRUST AND SAVING BANK 111 WEST MONROE STREE ; TRUE TEMPER RAILWAY APPLIANCES INC ; HARRIS TRUST AND SAVING BANK ; CHEMETRON RAILWAY PRODUCTS INC ; CHEMETRON RAILWAY PRODUCTS INC A CORP OF DE ; FEE GRAHAM M ; GENERAL ELECTRIC CAPITAL CORP

Inventor(s): (std): FEE G ; FEE GRAHAM M ; FEE GRAHAM MALEOD ; FEE GRAHAM MCLEOD ; GURAHAMU EMU FUII ; GURAHAMU MATSUKUREOODO FUII ; MCLEOD FEE G

Inventor(s): GRAHAM M FEE ; GRAHAM MCLEOD FEE

Agent(s): GEORGE H RICHES AND ASSOCIATES; RICHES MCKENZIE AND HERBERT LLP

Designated states: AT BE CH DE FR GB IT LU NL SE

Title: MODULAR MULTI-ARTICULATED PATIENT SUPPORT SYSTEM

Abstract: Source: US2006185090A A modular, multi-articulated patient support system includes independently adjustable columns connected by an adjustable base and supporting a patient support structure. Each column includes rotation, angulation and separation adjustment structure. The patient support may be raised, lowered and rotated about a longitudinal axis in either horizontal or tilted orientation. The patient support includes a body support rotatably coupled with right and left leg supports disengageable at the outboard ends, that can be tilted, rotated and locked in place. An intermediate brace engages the base when the outboard ends of the leg supports are disengaged. The patient support structure may include two pairs of patient supports, each attached at the outboard end of a column and having a free inboard end. A coordinated drive system raises, lowers, tilts and rotates the patient supports, which may be positioned in overlapping relation. The pairs of patient supports may be rotated in unison to achieve 180 degrees repositioning of a patient.

Classifications:

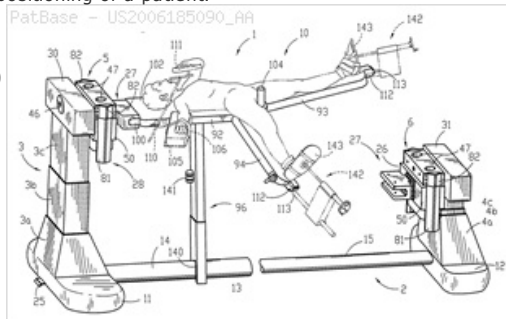
International (IPC 8-9): A47B13/00 A47B71/00 A47B73/00

A61B19/00 A61B5/00 A61B6/00 A61B6/04 A61G13/00 A61G13/02 A61G13/04 A61G13/06 A61G13/08 A61G13/10 A61G13/12 A61G7/00 A61G7/005 A61G7/008 A61G7/012 A61G7/015 A61G7/018 A63F9/00 A63H33/08 E04C1/00 F28D15/02 F28F13/18 G06F19/00 G06F3/0484 G09F19/00 H01L23/427 H01L23/46 H05K7/20 (Advanced/Invention); A61G13/00 A61G13/04 A61G13/08 A61G7/005 A61G7/012 H01L23/373 (Advanced/Non-invention); A47B73/00 A61B19/00 A61B6/04 A61G13/00 A61G7/002 (Core/Invention)

CPC: A61B6/0442 A61G7/1019 A61G13/1285 G09F19/00 H01L23/46 Y10T29/49815 Y10T428/12361 A63H33/04 G09F23/14 A63F9/1288 A63F2009/1292 A61G13/1225 A61G2203/42 A61G2210/50 A61G7/005 A61G13/1295 A61G13/1245 A61G2200/322 A61G2200/325 A61G2200/327 A61G2210/10 A61G7/008 A61G7/001 A61G13/101 A61G13/104 A61G13/1205 A61G13/121 A61G13/122 A61G13/1235 A61G2013/0054 A61G13/123 F28D15/0233 F28F13/187 F28F2225/04 H01L23/3735 H01L23/427 H01L2924/0002 A61G13/0018 A61B6/0421 A61B6/0457 H01L2924/00 Y10T29/49764 A61G7/018 A61B5/4836 A61B5/704 A61B5/7425 G06F3/04842 G06F19/32 A61B2017/00022 A61G7/002 A61B6/0407 A61G7/012 A61G7/015 A61G13/0036 A61G13/0054 A61G13/02 A61G13/04 A61G13/06 A61G13/08 A61G2203/12

European: A61G13/00E A61G13/04 A61G13/08 A61G13/12A2 A61G7/008 A61G7/00D K61B6/04A8 K61G13/12A3 K61G13/12A5 K61G200/32B K61G210/50

US: 1/1 128/845 165/104.21 29/407.01 29/426.1 361/700 428/16 428/33 428/596 5/600 5/601 5/601P 5/607 5/607P 5/607S 5/608 5/608P 5/608S 5/610 5/610P 5/610S 5/611 5/613 5/613S 5/616 5/617 5/617P 5/617S 5/618 5/618P 5/618S 5/619 5/621 5/621P 5/622 5/622S 5/624 5/624S 5/81.1R 5/81.1RP 56/10 56/11 56/13 56/19 56/24 56/7 700/92

**Family:**

Publication number	Publication date	Application number	Application date
AU2007248426 AA	20071115	AU20070248426	20070507
AU2007248426 BB	20110127	AU20070248426	20070507
AU2008317433 AA	20090430	AU20080317433	20081021
AU2008317433 BB	20140515	AU20080317433	20081021
AU2011200082 AA	20110203	AU20110200082	20110110
AU2011200082 BB	20120405	AU20110200082	20110110
AU2011269831 AA	20111229	AU20110269831	20110621
AU2012203355 AA	20120628	AU20120203355	20120607
AU2012203355 BB	20130912	AU20120203355	20120607
AU2014200274 AA	20140130	AU20140200274	20140116
AU2014200274 BB	20151119	AU20140200274	20140116
AU2015201454 AA	20150409	AU20150201454	20150319
AU2016200680 AA	20160218	AU20160200680	20160203
AU2016200680 BB	20170817	AU20160200680	20160203
CA2649350 AA	20081015	CA20072649350	20070507
CA2649350 C	20140318	CA20072649350	20070507
CA2706126 AA	20100421	CA20082706126	20081021
CA2803110 AA	20121218	CA20112803110	20110621
CA2803110 C	20170509	CA20112803110	20110621
CA2844427 AA	20140914	CA20142844427	20140303
CN101909570 A	20101208	CN200880122397	20081021
CN101909570 B	20130306	CN200880122397	20081021
CN103298440 A	20130911	CN201180039162	20110621
CN105125364 A	20151209	CN201510350452	20110621
EP1850696 A2	20071107	EP20050795928	20050909
EP1850696 A4	20120118	EP20050795928	20050909
EP2015725 A2	20090121	EP20070776853	20070507
EP2015725 A4	20090812	EP20070776853	20070507
EP2211815 A1	20100804	EP20080842818	20081021
EP2211815 A4	20140730	EP20080842818	20081021
EP2582345 A1	20130424	EP20110798501	20110621
EP2582345 A4	20150429	EP20110798501	20110621
EP2582345 B1	20170517	EP20110798501	20110621
EP2674143 A2	20131218	EP20130183485	20050909
EP2674143 A3	20140507	EP20130183485	20050909
EP2890351 A1	20150708	EP20130833588	20130828
EP2890351 A4	20160518	EP20130833588	20130828
EP3269343 A1	20180117	EP20170162141	20110621
ES2636951 T3	20171010	ES20110798501T	20110621
JP2009534159 T2	20090924	JP20090507857T	20070507
JP2011517963 T2	20110623	JP20100531027T	20081021
JP2012236054 A2	20121206	JP20120171886	20120802
JP2013529499 T2	20130722	JP20130516564T	20110621

JP2014221384 A2	20141127	JP20140132463	20140627
JP2014221400 A2	20141127	JP20140142074	20140710
JP2016105800 A2	20160616	JP20160013490	20160127
JP2016152923 A2	20160825	JP20160041088	20160303
JP2017121491 A2	20170713	JP20170011315	20170125
JP5323850 B2	20131023	JP20100531027T	20081021
JP5571850 B2	20140813	JP20130516564T	20110621
KR101279010 B1	20130702	KR20087029815	20070507
KR101804357 B1	20180110	KR20147033639	20110621
KR20090029712 A	20090323	KR20087029815	20070507
KR20100119856 A	20101111	KR20107011139	20081021
KR20130029429 A	20130322	KR20137001601	20110621
KR20140145634 A	20141223	KR20147033639	20110621
KR20170136643 A	20171211	KR20177034163	20110621
RU2013102492 A	20140727	RU20130102492	20110621
RU2571805 C2	20151220	RU20130102492	20110621
RU2571805 C9	20160327	RU20130102492	20110621
US2006185090 AA	20060824	US20050062775	20050222
US2006185091 AA	20060824	US20050159494	20050623
US2007192960 AA	20070823	US20070788513	20070420
US2009126116 AA	20090521	US20080288516	20081020
US2009282614 AA	20091119	US20090460702	20090723
US2011099716 AA	20110505	US20100803173	20100621
US2011107516 AA	20110512	US20100803192	20100621
US2011107517 AA	20110512	US20100803252	20100622
US2012023672 AA	20120202	US20110317012	20111006
US2012198625 AA	20120809	US20110374034	20111208
US2012246829 AA	20121004	US20110317397	20111017
US2013111666 AA	20130509	US20120573959	20121016
US2013117938 AA	20130516	US20130694765	20130102
US2013205500 AA	20130815	US20130815982	20130320
US2013219623 AA	20130829	US20130986060	20130314
US2013254992 AA	20131003	US20130902510	20130524
US2013254993 AA	20131003	US20130902525	20130524
US2013254994 AA	20131003	US20130902536	20130524
US2013254995 AA	20131003	US20130902550	20130524
US2013254996 AA	20131003	US20130902565	20130524
US2013254997 AA	20131003	US20130902577	20130524
US2013312181 AA	20131128	US20130955642	20130731
US2013312182 AA	20131128	US20130955707	20130731
US2013312187 AA	20131128	US20130956704	20130801
US2013312188 AA	20131128	US20130956728	20130801
US2013318718 AA	20131205	US20130902455	20130524
US2013318719 AA	20131205	US20130902487	20130524
US2013326812 AA	20131212	US20130902479	20130524
US2013326813 AA	20131212	US20130902466	20130524
US2014007349 AA	20140109	US20130017838	20130904
US2014020181 AA	20140123	US20130033895	20130923
US2014033434 AA	20140206	US20130051055	20131010
US2014033436 AA	20140206	US20130050998	20131010
US2014068861 AA	20140313	US20130012434	20130828
US2014082842 AA	20140327	US20130096875	20131204
US2014109316 AA	20140424	US20130012525	20130828
US2014173826 AA	20140626	US20140195326	20140303
US2014196212 AA	20140717	US20140218599	20140318
US2014201913 AA	20140724	US20140218431	20140318
US2014201914 AA	20140724	US20140218667	20140318
US2014208512 AA	20140731	US20140230432	20140331
US2014247557 AA	20140904	US20140173986	20140206
US2014272204 AA	20140918	US20130803173	20130314
US2014317847 AA	20141030	US20140328058	20140710
US2015059094 AA	20150305	US20140538310	20141111
US2015150743 AA	20150604	US20150616500	20150206
US2016008201 AA	20160114	US20150862835	20150923
US2016038364 AA	20160211	US20150923044	20151026
US2016136027 AA	20160519	US20160005493	20160125
US2016166452 AA	20160616	US20160042897	20160212
US2016213542 AA	20160728	US20160017110	20160205
US2016317372 AA	20161103	US20160207599	20160712
US2016324706 A9	20161110	US20130956728	20130801
US2017071809 AA	20170316	US20160341167	20161102
US2017151114 A9	20170601	US20130012434	20130828
US2017151115 AA	20170601	US20170431439	20170213
US2017181908 AA	20170629	US20170421994	20170201
US2017189254 AA	20170706	US20170465289	20170321
US2017202523 AA	20170720	US20170479007	20170404
US2017319411 AA	20171109	US20170661261	20170727
US2017333276 AA	20171123	US20170660336	20170726
US2017348171 AA	20171207	US20170631911	20170623
US2018036193 AA	20180208	US20170789345	20171020
US7152261 BB	20061226	US20050062775	20050222

US7343928 BB	20080718	US20050158493	20050420
US7739762 BB	20100622	US20080288516	20081020
US8060960 BB	20111122	US20090460702	20090723
US8677529 BB	20140325	US20130694765	20130102
US8707484 BB	20140429	US20100803173	20100621
US8719979 BB	20140513	US20110317012	20111006
US8826474 BB	20140909	US20130902525	20130524
US8826475 BB	20140909	US20130902510	20130524
US8839471 BB	20140923	US20130902479	20130524
US8844077 BB	20140930	US20130955707	20130731
US8856986 BB	20141014	US20130902487	20130524
US8938826 BB	20150127	US20130902455	20130524
US8978180 BB	20150317	US20130902536	20130524
US9180062 BB	20151110	US20130902577	20130524
US9186291 BB	20151117	US20100803192	20100621
US9198817 BB	20151201	US20130902565	20130524
US9205013 BB	20151208	US20130902466	20130524
US9211223 BB	20151215	US20130815982	20130320
US9226865 BB	20160105	US20130017838	20130904
US9265679 BB	20160223	US20130050998	20131010
US9289342 BB	20160322	US20130902550	20130524
US9295433 BB	20160329	US20130955642	20130731
US9301897 BB	20160405	US20130986060	20130314
US9308145 BB	20160412	US20110374034	20111208
US9339430 BB	20160517	US20130012525	20130828
US9358170 BB	20160607	US20140195326	20140303
US9364380 BB	20160614	US20130096875	20131204
US9414982 BB	20160816	US20160005493	20160125
US9456945 BB	20161004	US20140218431	20140318
US9468576 BB	20161018	US20130956704	20130801
US9504622 BB	20161129	US20130033895	20130923
US9510987 BB	20161206	US20150862835	20150923
US9610206 BB	20170404	US20140218599	20140318
US9636266 BB	20170502	US20160042897	20160212
US9642760 BB	20170509	US20130012434	20130828
US9685393 BB	20170620	US20140173986	20140206
US9744087 BB	20170829	US20130956728	20130801
US9744089 BB	20170829	US20160207599	20160712
US9757300 BB	20170912	US20140230432	20140331
US9849054 BB	20171226	US20120573959	20121016
WO06091239 A2	20060831	WO2005US32550	20050909
WO06091239 A3	20070531	WO2005US32550	20050909
WO07130679 A2	20071115	WO2007US11056	20070507
WO07130679 A3	20081218	WO2007US11056	20070507
WO09054969 A1	20090430	WO2008US12014	20081021
WO11162803 A1	20111229	WO2011US01101	20110621
WO13058806 A1	20130425	WO2012US00518	20121016
WO14021924 A1	20140206	WO2013US00179	20130731
WO14021925 A2	20140206	WO2013US00180	20130801
WO14021925 A3	20140522	WO2013US00180	20130801
WO14035460 A1	20140306	WO2013US00199	20130828

Priority:

AU20070248426	20070507	AU20110200082	20110110	AU20110269831	20110621
AU20120203355	20120607	AU20140200274	20140116	JP20090507857	20070507
EP20050795928	20050909	JP20130516564	20110621	JP20120171886	20070507
AU20150201454	20150319	JP20130516564T	20110621	CN201180039162	20110621
AU20160200680	20160203	JP20090507857T	20070507	EP20110798501	20110621
US20090460702	20090723	US20100803173	20100621	US20100803252	20100622
US20070788513	20070420	US20060798288P	20060505	US20110317012	20111006
US20050159494	20050623	US20050062775	20050222	US20100459264P	20101209
US20110374034	20111208	US20110317397	20111017	US20100803192	20100621
US20080288516	20081020	US20070960933P	20071022	US20070788503	20070420
JP20140132463	20110621	JP20140142074	20070507	JP20160013490	20160127
JP20160041088	20160303	JP20160041088	20070507	US20130694765	20130102
US20130815982	20130320	US20130986060	20130314	US20130902510	20130524
US20130902525	20130524	US20130902536	20130524	US20130902550	20130524
US20130902565	20130524	US20130902577	20130524	US20130955642	20130731
US20130955707	20130731	US20120742167P	20120803	US20130956704	20130801
US20120694392	20121128	US20120742098P	20120802	US20120743240P	20120829
US20130849035P	20130117	US20120795649P	20121022	US20130849016P	20130117
US20110629815P	20111128	US20130956728	20130801	US20130902455	20130524
US20130902487	20130524	US20130902479	20130524	US20130902466	20130524
US20130017838	20130904	US20130033895	20130923	US20130051055	20131010
US20130815791	20130315	US20130050998	20131010	US20130852199P	20130315
US20130012434	20130828	US20130096875	20131204	US20130012525	20130828
US20140195326	20140303	US20140218431	20140318	US20140173986	20140206
US20130851199P	20130304	US20120573959	20121016	US20110627752P	20111017
WO2007US11056	20070507	WO2005US32550	20050909	WO2011US01101	20110621
WO2008US12014	20081021	US20140218599	20140318	US20140218667	20140318
US20140230432	20140331	US20140328058	20140710	US20140538310	20141111
US20150616500	20150206	WO2013US00199	20130828	US20150862835	20150923
US20150923044	20151026	US20160005493	20160125	US20160017110	20160205
US20160207599	20160712	US20160341167	20161102	US20160042897	20160212
US20170431439	20170213	US20170421994	20170201	US20170479007	20170404
US20170661261	20170727	US20170660336	20170726	US20170631911	20170623
US20170789345	20171020				

Probable Assignee: JACKSON ROGER P
Assignee(s): (std): AGUIAR DAVID ; CHEN XIAODAN ; GUERRA LAWRENCE E ; DEMARIA MICHAEL ; DZHEKSON RODZHER P ; JACKSON ROGER P ; JACKSON ROGER ; LAMB STEVE ; KRESSE DAVID ; MIZUHO ORTHOPEDIC SYSTEMS ; ROGER JACKSON ; MIZUHO ORTHOPEDIC SYSTEMS INC ; WAGGONER TREVOR A ; WALTON STEVEN A ; WANG BIN ; SUN ZHEN ; QIU HUIHE ; UNIV HONG KONG SCIENCE AND TECHN ; PHILBRICK CHRISTOPHER ; HERRON MICHAEL A ; STANLEY MARK ; UNIV HONG KONG SCIENCE AND TECH

Assignee(s): HONG KONG UNIV OF SCIENCE AND TECHNOLOGY ; PHILBRICK CHRISTOPHER154E JEFFERSON STREETFRANKENMUTHMI48734US ; ROGER P JACKSON ; JACKSON ROGER P MD

Inventor(s): (std): HERRON MICHAEL A ; GUERRA LAWRENCE E ; DEMARIA MICHAEL ; DAVID KRESSE ; CHEN XIAODAN ; AGUIAR DAVID ; WALTON STEVEN R ; WAGGONER TREVOR A ; STEVE LAMB ; STANLEY MARK ; PHILBRICK CHRISTOPHER ; MICHAEL DEMARIA ; MARK STANLEY ; LAMB STEVE ; KRESSE DAVID ; HERRON MICHAEL A ; DZHEKSON RODZHER P ; JACKSON ROGER P ; WANG BIN ; WALTON STEVEN A ; SUN ZHEN ; QIU HUIHE

Inventor(s): PHILBRICK CHRISTOPHER154E JEFFERSON STREETFRANKENMUTHMI48734US ; JACKSON ROGER ; ROGER P JACKSON

Agent(s): PHILLIPS ORMONDE FITZPATRICK; SHELSTON IP; A J PARK; AJ PARK; FETHERSTONHAUGH AND CO; BORDEN LADNER GERVAIS LLP; GOWLING LAFLEUR HENDERSON LLP; POWELL STEPHEN DAVID ET AL; MODIANO MICAELA NADIA; POWELL STEPHEN DAVID; WILLIAMS GARETH OWEN; WILLIAMS POWELL; ELZABURU SLP ELZABURU SLP; ONO SHINJIRO; SHAMOTO ICHIO; KOBAYASHI YASUSHI; TOMITA HIROYUKI; CHIBA AKIO; TOTSUKA KIYOTAKA; HOSHINO OSAMU; YAMAMOTO OSAMU; TAKEUCHI SHIGEO; NAKANISHI MOTOHARU; MIYAMAE TORU; LAW OFFICE OF JOHN C MCMAHON; JOHN C MCMAHON; THEODORE J BIELEN JR BIELEN LAMPE AND THOEMING; JOHN C; MCMAHON JOHN C; THEODORE J; POLSINELLI PC; OSHA LIANG LLP; BIELEN THEODORE J JR ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

Title: APPARATUS AND METHODS FOR UNDERGROUND STRUCTURES AND CONSTRUCTION THEREOF

Abstract: Source: US2009191003A Described herein are apparatus, systems and methods useful in forming underground vertical structures. Methods are described for constructing an underground vertical structure, comprising the steps of excavating **soil** to a sufficient depth to create a circular void to accommodate a plurality of segments; assembling a ring shaped structure comprising the plurality of segments; connecting the outside surface of the ring shaped structure with the **soil** in said circular void, thereby securing the ring shaped structure to the **soil**; excavating earth beneath the ring shaped structure to accommodate a second ring shaped structure; and repeating steps b-d thereby forming one or more additional ring shaped structures downward into the earth below already formed ring shaped structures until a predetermined depth is reached; thereby forming the underground vertical structure. Systems to perform the above methods are also disclosed.

Classifications:

International (IPC 8-9): E02D17/04 E02D29/02 E02D29/045

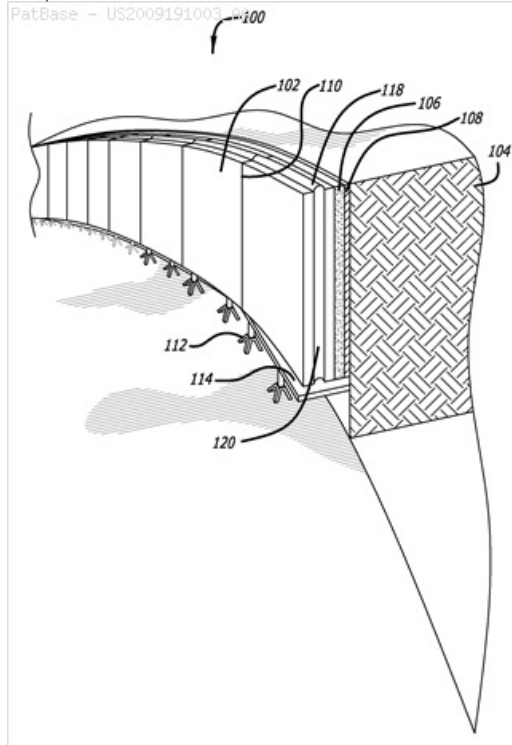
E02D29/055 E21D11/08 E21D21/00 (Advanced/Invention);

E02D17/02 E02D29/045 E21D11/08 (Core/Invention)

CPC: E02D17/04 E02D29/055 E02D29/02 E02D2600/20 E02D29/045

European: E02D17/04

US: 405/132 405/132P 405/133 405/134 405/135 405/229 405/262 52/169.1



Family:

Publication number	Publication date	Application number	Application date
CA2713724 AA	20090806	CA20092713724	20090128
CA2713724 C	20161122	CA20092713724	20090128
DE602009007888 D1	20120823	DE200960007888T	20090128
DE602009020146 D1	20140109	DE200960020146T	20090128
EP2235268 A2	20101006	EP20090705155	20090128
EP2235268 B1	20120627	EP20090705155	20090128
EP2503061 A1	20120926	EP20120173159	20090128
EP2503061 B1	20131113	EP20120173159	20090128
US2009191003 AA	20090730	US20090361425	20090128
US2010189512 AA	20100729	US20100756944	20100408
US2013078040 AA	20130328	US20120666505	20121101
US2014227038 AA	20140814	US20140252619	20140414
US2016215472 AA	20160728	US20160089267	20160401
US7722293 BB	20100525	US20090361425	20090128
US8322949 BB	20121204	US20100756944	20100408
US8714877 BB	20140506	US20120666505	20121101
WO09097355 A2	20090806	WO2009US32275	20090128
WO09097355 A3	20091119	WO2009US32275	20090128

Priority:

EP20090705155	20090128	EP20120173159	20090128	US20080024171	20080128
US20100756944	20100408	US20090361425	20090128	US20080024171P	20080128
WO2009US32275	20090128	US20120666505	20121101	US20140252619	20140414
US20160089267	20160401				

Probable Assignee: KRUSE DARIN R

Assignee(s): (std): KRUSE DARIN ; KRUSE DARIN R

Assignee(s): KRUSE DARIN SIMI VALLEY

Inventor(s): (std): KRUSE DARIN ; KRUSE DARIN R

Inventor(s): KRUSE DARIN R SIMI VALLEY ; KRUSE DARIN SIMI VALLEY

Agent(s): SMART AND BIGGAR; WEICKMANN AND WEICKMANN PATENTANWALTE RECHTSANWALT PARTMBB; GREEN MARK CHARLES; K AND L GATES LLP; LOUIS C; BRIAN J; CULLMAN LOUIS C

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW