[00125] Fig. 38A is a pictorial view of a lifting-body type aerospace plane with folded lift and control structures for use with a preferred embodiment of the invention.

[00126] Fig. 39 is a schematic view of a satellite or other payload carried on a rocket according to part of a preferred embodiment of the invention with jettisonable, aerodynamic, protective shells.

[00127] Figs. 40 and 41 show a perspective and a cross-sectional view of a rod as a type of cable to be used instead of a wire rope.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

[00128] The preferred embodiment of the invention is initially described in general terms referring to some components described in more detail below. The general components are shown in such general terms in Figs. 1, 1A and 1B. The preferred embodiment is a rocket launch system 1 which includes apparatus for moving a rocket 18 to be launched. Rocket 18 is first either in a container or rocket-transporting device such as a carriage 20 or is to be loaded into carriage 20, from storage racks 7. Carriages 20 have cylindrical lengthwise bores into open-ended, pressure-and-heat continuous tubes 836 (Figs. 13, 13C) which are disposed and held in place for receiving a rocket 18. Carriages 20 are weatherproof and have a longitudinal axis, which is the same longitudinal axis of tube 836. Rockets 18, components thereof, and carriages 20 which may or may not be loaded with rockets 18, are conveyed to storage racks 7 by an appropriate transport railing car on a railway 3 to an off loading area 5. A crane 48 carries respectively rockets 18, and/or carriage 20 and/or a component of rocket 18 travels or is used to maintain various parts of the rocket launch system 1 on relatively narrow crane tracks 78. Rockets 18 may have fins 21 (Fig. 7), and each carriage 20 has internal supports in addition to tube 836.

[00129] A transverse loader 50 travels on tracks 90 in the directions shown by arrows A in Fig. 1A, tracks 90 being located further apart from each other than crane tracks 78. Transverse loader 50, which is preferentially used to transfer rockets 18, carriages 20, etc., from storage racks 7 to assembly or fuelling bays 10, includes trucks 92 for travelling on tracks 90, and has a wheeled truck 98 movable on a pair of transverse, parallel rails 97 on top of beams 96, and an elevator assembly 100 attached to a wheeled truck 98. Crane 48, which is preferentially used to perform launch system maintenance, may also be used to remove rockets 18, and/or carriages 20, etc. from storage racks 7, and transfer rockets 18 and/or carriages 20 to assembly/fuelling bays 10 (there would usually be a plurality of assembly bays 10). Elevator assembly 100 moves on rails 97 in the direction shown by the arrows B. Carriage 20, which may or may not have been loaded with a rocket 18 by one way or another, is placed in assembly bay 10. The entire operation is controlled by appropriate control equipment at a local launch control or systems control bunker 120.

all structures and assemblies from and including docking station 166 up to said balloons 160, and tension cables 27 and 184 so that they may carry a useful load. Cables 27 are separated from each other by a set of spacer or stabilizer assemblies 158. (Cables have been shown throughout most of the description as wire ropes, but they could be rods as explained later.)

[00133] Each assembled rocket 18 within a carriage 20 is transported from an assembly bay 10 into lower guide tube 124, then into secondary guide structure 125, and thence to docking station 166 by means of ~~a driving structure~~ traction drives 26 which ~~can be~~ include an electrically powered energizing apparatus 168. Traction drives 26 can comprise a set of traction ~~drives 26~~ drive wheels 26A connected to apparatus for converting electrical power to mechanical power and for interconnecting together the mechanical and electrical apparatus. Thus, a set of gears in a gearbox G can be operatively connected to electrically powered energizing apparatus 168. The latter can include a motor-generator M-G operatively connected to gears in gearbox G as shown in Figs. ~~9 and~~ 9C, 15C and 25. Traction drives 26 are built into carriage 20. Carriage 20 travels along and ~~has an~~ electrically powered energizing apparatus ~~for deriving~~168 derives power from primary cables 27 ~~whose~~as when carriage 20 is lifted up (or climbs) cables 27 and other cables connected to them as described below by traction drives 26. The self weight ~~is~~ of cables 27 and all items permanently affixed to said cables are periodically offset by lighter-than-air balloons 164 and which are held taut by lighter-than-air balloons 160. Traction drive wheels 26A and electrically powered energizing apparatus 168 (composed of gears in gearbox G coupled to motor generator M-G) convert electrical energy to kinetic energy to energize electrically powered energizing apparatus 168. The latter is advantageously a reversible electrically powered energizing apparatus for converting potential energy to electric power as carriage 20 descends, and delivering electric power to the electric power lines forming part of the cables upon which carriage 20 is traveling. When carriage 20 requires electrical energy to ascend, wheels 26A are driven by motor generator M-G via converting apparatus such as set of gears in gearbox G which rotate in response to being energized by motor-generator M-G. When carriage 20 descends under the influence of gravity, traction drives 26 act as a regenerative brake and operate gears in gearbox G (or any other device for changing rotational speed) which drives motor-generator M-G (or any other device for converting mechanical energy to electrical energy). Balloons 160 and 164 preferably have inclined sides such as shown in Figs. 1, 11, 20A and 28; cylindrical sides as shown in Fig. 20B, or can be spherical or have other shapes as well. High altitude balloons are well known and are continuously being developed and improved. Appropriate balloons 160 and 164 should preferably remain functional in the applications for the present invention for many months and optimally for years. Balloons for going to the stratosphere have been known and used since the 1950's. Carriage 20 is lifted further along secondary cables 184 and rotated and then tilted according to predetermined amounts as discussed below, after which rocket 18 is launched.

[00134] The foregoing description provides an overview of components of a preferred form of the invention. Set forth below is a more detailed discussion of the invention in its preferred forms.

[00135] Rockets 18 and their respective payloads are assembled, loaded into carriages 20 and fuelled if required, and kept in blast-resistant assembly bays 10 prior to launch. Each bay 10 is located

below the ground surface and is constructed so as to limit damage in case there is an accidental detonation of the propellant of a rocket 18. Each bay 10 has an inverted surface in the shape of an inverted frustum 12 referring to Figs. 2 and 11 of a cone made of an appropriate reinforced concrete material or the like for limiting the effects of any such blast by deflecting it upwardly and laterally. Each bay 10 is connected by means of below-the-ground paths 14 and 14A to closed loop path 15. Path 14 ends at an inclined open chute 86 (Fig. 6) with upwardly sloping wall 16A (Fig. 2) facing into the lateral opening of assembly bay 10. This deflects any lateral component of the possible blast from bay 10 upwards and away from the supporting apparatus (structures, equipment) for launch system 1, and from personnel. Path 14 then turns at approximately 90 degrees to join with path 14A. Each bay 10 is capable of holding a rocket 18 within a carriage 20. Each rocket 18 can comprise a short duration booster rocket motor for ejecting rocket 18 from its open ended continuous tube 836 (Fig. 13A) within carriage 20 with

such a velocity that, even if the main rocket engine misfires, the short duration booster rocket motor and rocket 18 will not fall and damage rocket launching system 1. The booster rocket motor would operate only within the heat and pressure resistant confines of the container in which it is held, as described below. Each rocket 18 has one or more main motors for driving rocket 18 to its design velocity.

[00136] Each carriage 20 has opposed end openings 24 (Figs. 9C, 13, 13A), and hinged weather end covers or retractable membranes 30 (Figs. 9C, 13, 13A) at both ends thereof to protect rocket 18 in carriage 20 while carriage 20 travels from ground through the atmosphere. These covers 30 can be swung to open both ends of carriage 20 or membranes 30 retracted to likewise open both ends of carriage 20, as shown in Fig. 13A. Also within opposed end openings 24 are reversible variable pitch thrusters 31 hinged parallel to one side of carriage 20 so that they may be rotated to a position perpendicular to the ends by use of actuators 29 (Figs. 13B, 13C). Each carriage 20 has multiples of three traction drives 26 (Fig. 9C~~; discussed in detail below~~) equally spaced around the periphery of carriage 20 for the purpose of gripping and pulling the ~~respective~~ carriage 20 up equally spaced primary power cables 27. Cables 27 and 184 have suitably high tensile strengths and conductivity, as discussed below. Traction drives 26 are powered by the foregoing three equally spaced primary power cables 27, cables 27 carrying three-phase power from which traction drives 26 draw their power. Traction drives 26 are reversible, using electrical power to raise ~~the~~ carriage 20 or ~~generating~~generate electrical power when used as regenerative brakes. Traction drives 26 operating in the regenerative braking mode convert the ~~kinetic~~potential energy of the carriage 20 as it is lowered, into electricity which is fed back to cables 27, which recovered electricity may be used to assist the raising of other loaded carriages in adjacent launch systems 1. Traction drives 386 (Fig. 28) and 26 (Fig. 9C) operate in a similar manner. The interior of carriage 20 is designed to be capable of resisting the heat, and blast effects caused by the operation of the short duration booster rocket motor. End covers or membranes 30 (shown in detail in Figs. 9C and 13A) protect rocket 18 held in carriage 20 from any adverse weather and may be used to contain inert or relatively inert gases within the interior of carriage 20 surrounding rocket 18 such as nitrogen to inhibit combustion of any reactive materials escaping from rocket 18 during transport to the high altitude launching position. The upper end of carriage 20 may have twist pin lock receptacles 32 (Fig. 13A) similar to fractional rotation twist pin sockets 154 (Fig. 9) (discussed below) to receive twist lock pins 204 (Figs. 12 and 13) similar to a fractional rotation twist lock pin 144 (Fig. 9) (also discussed below) which are used to lift carriages 20 in preparing for a rocket launching process as discussed below.

[00137] Each carriage 20 has internal retractable arms 34 or 35 (Fig. 26, 27) which hold the rocket securely within carriage 20 such that centers of gravity 36 and 37 (Fig. 13) of carriage 20 and rocket 18 respectively are stably positioned in the middle of carriage 20 at its center of

carriage 20 holding a rocket 18 moving in pathway 15 towards launcher 119 discussed below. Another lateral carrying device 46 carrying an empty carriage 20 is traveling away from launcher 119 which dispensed a rocket 18 from carriage 20 at high altitude, moving in pathway 15 returning to an unoccupied assembly bay 10 to be reloaded with rocket 18 or returning to storage rack 7 for servicing if required.

[00149] Referring back to Fig. 5, rocket launch system 1 further includes launcher 119. A local launch control bunker 120 directs the operation of rocket launch system 1, directing the flows of electrical energy to and from adjacent launch systems 1 from energy sources such as power facility 468 or other adjacent rocket launch systems 1, and housing the computer control and surveillance systems, utilizing data from the various measuring and imaging devices placed throughout launch system 1. This is where the personnel are generally located for controlling the local rocket launch system 1 and coordinating launches from the other members of the group of launch systems for minimizing the use of energy.

[00150] Elevating assembly 60 is disposed beneath the ground as shown in Figs. 2, 8 and 9. Elevating assembly 60 may have an elevating mechanism such as a hydraulic piston rod 68 upon which sits upper swivelling assembly 61 (Fig. 9) for rotating, by means of a rotary drive 134, a carriage 20 with rocket 18 within, loaded on lateral conveying device 46 in the direction shown by arrow J. Elevating system 60 described in more detail below with respect to Fig. 8, includes rod 68 having a wide, non-rotating lower bed 135 fixed to rod 68, mounted for supporting upper swivelling assembly 61. Upper swivelling assembly 61 is composed of a rotatable bed 136 (with a table portion 141) mounted on top of non-rotating lower bed 135 (which is not part of turntable mechanism 63).

[00151] Reference is now made to Figs. 8 and 9. Piston rod 68 is part of a piston 67 extending from a hydraulic cylinder 69. Hydraulic cylinder 69, piston 67 and rod 68 do not rotate.

[00152] The foregoing hydraulic system is not the only way to operate the elevating mechanism. An electro-mechanical system could form the elevating mechanism.

[00153] Turning next to Fig. 10, turntable mechanism 63 is an above ground portion of rocket launcher 119 for receiving rocket-loaded carriages 20 from elevating assembly 60 and orienting them to be transported is shown. The upward movement of rocket-loaded carriage 20 is shown by the arrow L. As stated above, turntable mechanism 63 includes turntable base 122 and turret assembly 123. Turntable base 122 is attached to the earth.

[00154] Turntable 72 could be quite heavy, weighing several tons, and should be supported by a structure able to support such a heavy load, to withstand uplift and lateral forces, and rotate smoothly. A detail of an appropriate turntable support device is shown in Fig. 8A.

[00155] Fig. 8A shows turntable base 122 having a horizontal surface of a wheel engaging base 270 for being

engaged by wheels 284, an upstanding tubular part 272, and a horizontal, annular flange 274 extending outwardly towards the outer circumference of turntable base 122. Turntable 72 has a downwardly extending tubular part 276 at the perimeter of turntable 72, from which extends an inwardly extending horizontal, annular flange 278 having a number of wheel axle holders 280, 281 and 282 extending towards wheel engaging base 270, upstanding tubular part 272 and horizontal, annular flange 274, respectively. Each axle holder 280, 281 and 282 respectively holds the axles of wheels 284, 286 and 288 respectively. Wheels 284, 286 and 288 ride on the surfaces of wheel engaging base 270, upstanding tubular part 272 and horizontal, annular flange 274 to enable the smooth circular rotation of turntable 72 shown in Fig. 8 by the arrow K. Alternatively, referring to Fig. 8B, turntable base 122 could have a horizontal bearing base 290, an upstanding tubular part 291 and a horizontal, annular flange 292. Likewise, turntable 72 could alternatively have a downwardly extending tubular part 293 and an inwardly extending horizontal, annular flange 294. A set of rolling bearings such as bearing balls or crossed rollers 295 is located between horizontal, annular flange 294 and each of bearing base 290 and horizontal, annular flange 292, and appropriate annular bearing surfaces such as grooves 296 would be used to enable the rotation of turntable 72 with reduced friction than if bearings were not provided.

[00156] Turntable 72, based on the size of carriage 20, could be about 46 feet in diameter. For example, if the tubular interior of carriage 20 for containing rocket 18 has a radius of 8 feet, and the minimum thickness of carriage 20 holding rocket is 2 feet, with a clearance of centrally located carriage 20 is 3 feet, the diameter of turntable 72 would be about 46 feet. This is shown in the following drawing:

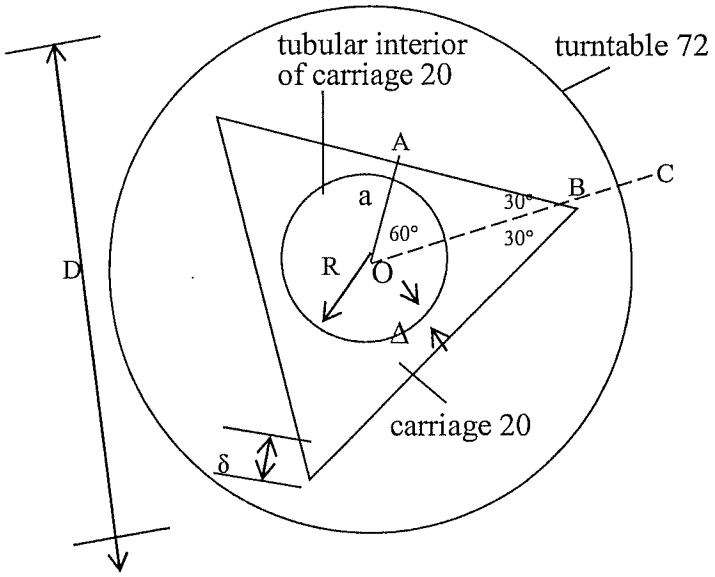


table portion 141 as do fractional twist lock pins 144 (four are shown) (shown in detail in Fig. 9B). These interconnect with lateral conveying device 46 as explained below. Of course, the location of the respective pins 142 and 144, and the respective sockets could be reversed between the lateral conveying devices 46 and the portion 141.

[00164] Upper swivelling assembly 61 of elevating assembly 60 is mounted on rod 68 and can be raised as shown by arrow N to permit engagement of lower tapered alignment pins 142 and fractional rotation twist lock pins 144 shown in Fig. 9 into ~~a~~ corresponding alignment pin sockets 152 and ~~a~~ twist pin socket 154 in lateral conveying device 46.

[00165] The upper surface of lateral conveying device 46 has upwardly extending tapered alignment pins and fractional rotation pins which are virtually the same as lower tapered alignment pins 142 and fractional rotation twist lock pins 144 extending from the top of table portion 141. A corresponding alignment pin socket 155 and a twist lock socket 153 are provided in the lower face of carriage 20 to receive the tapered alignment pins and fractional rotation pins on the top of device 46 to releasably attach carriage 20 to lateral conveying device 46.

[00166] Lateral conveying device 46 has four wheels 58 positioned and contoured to ride on electric rails or tracks 17, and including tracks 17 adjacent to table portion 141, and are independently alignable as mentioned earlier. Lateral conveying device 46 may be powered from electric rails 17 in ways similar to electric trains or tram cars (which would have to be connected to an electric power source) or from some other on board power source such as fuel cells or internal combustion engines.

[00167] Lower guide tube 124 has internal carriage guides 133 (Figs. 8, 10) which extend into each of corner recesses 130 extending along the vertical intersections of sides 22, also shown in enlarged form, (Fig. 10) of carriage 20 to engage traction drives 26 of each carriage 20 to move each carriage 20 along carriage guides 133, and to maintain the orientation of carriage 20 in lower guide tube 124. Carriage traction drives 26 are provided for gripping primary power cables 27. Carriage traction drives 26 are ~~longitudinal~~ mechanisms having cross sections partially enveloping primary cables 27 on which carriages 20 ride, and from which they derive power~~. Traction drives 26~~ or to which they deliver power. Referring to Fig. 15C, one of traction drives 26 is shown as having two opposing traction drive wheels 26A in engagement with primary cable 27. Each traction drive 26 includes a gearbox G and motor-generator M-G. As mentioned earlier, traction drives 26 may include motor-generators M-G and ~~gear boxes having pairs of~~gearboxes G and opposing cylindrical wheels 26A operatively connected thereto, each having an annular groove 137 for receiving a cable 27 as shown in ~~Fig.~~Figs. 9C, 15C and 25. Wheels 26A rotate in opposite directions as shown by arrows O_1 and O_2. Traction drives 26 are positioned along the length of a carriage 20~~. Appropriate grooves or surface~~ Surface roughening or ~~appropriate surface~~ modification could be provided on the ~~grooves~~gripping surfaces of traction ~~drives 26~~wheels 26A to enhance the appropriate surface friction of the pairs of traction drive wheels 26A which in effect pinch respective cables 27. Electric ~~motors would~~ motor-generators M-G of traction drives 26 derive electrical power from primary cables 27 (and any subsequent cables), to drive/rotate ~~the~~ respective pairs of ~~traction drive~~ wheels 26A~~.~~

through gearboxes G as carriages 20 ascend primary cables 27, and motor-generators M-G provide electrical power to primary cables 27 as carriages 20 descend primary cables 27. The motors could ~~be connected to gear boxes, and the output shaft could~~ rotate more than one pair of

than lighter-than-air balloons 160, must be interspersed along cables 27 to relieve the self weight of cables 27 and the weight of the supporting structure and spacer assemblies 158 of primary cables 27 together with daily thermal lift variations with a margin of safety to prevent cable breakage under self weight, the net effect being that cables 27 with associated balloons approximate cables with no weight or negative weight. Primary cables 27 are engaged by and provide power to a winch or hoist ~~168~~169 discussed below, and form a cableway path 170 shown in Figs. 11 and 13. Cableway path 170 is formed of and enclosed by primary cables 27, which carriage 20 engages and from which derives power so it can travel along cables 27. Tensioning balloon attachment frame 162 is composed of an upper ring 145 and a lower ring 146 (Figs. 13-14) which are counter rotational, about a rotary bearing 149. Upper ring 145 and lower ring 146 are driven by a geared rotational drive system 177, and are described below.

[00172] Docking station 166 is shown in Figs. 13 and 14. Docking station 166 has upper ring part 172 which can be rotated with respect to a lower ring part 174, parts 172 and 174 being engagable with a ring bearing 176, are driven by a geared rotational drive system 147 (also see Fig. 28 for a corresponding rotational drive system 379), which includes and is assisted by reaction force thrusters 178. Geared rotational drive systems 177 and 147 are also used to provide the opposed rotation of upper ring 145 with respect to lower ring 146 of tensioning balloon attachment frame 162, and also of upper ring part 172 and lower ring part 174 of docking station 166 mentioned above. The rotational drive systems 177 and 147 of tensioning balloon attachment frame 162 and docking station 166, respectively, are coordinated so that all components between and inclusive of, upper ring part 172 and lower ring 146 rotate together as a unit, with associated cables kept from twisting around each other. Force thrusters 178 and 148 counter wind induced rotation or rotation resulting from the rotation of a carriage 20, when the lower end of carriage 20 is held within upper ring part 172 of docking station 166, and carriage 20 is being rotated into an optimal direction for launch. Docking station 166 has two sets of three internal carriage guides 180A, 180B (Figs. 13, 14) for entering radial recesses 130 of each carriage 20 to keep the respective carriages 20 in proper alignment and stable, while supplying electrical power to the carriage traction drives 26.

[00173] Still referring to Figs. 13 and 14, lift ring assembly 182 is shown. Lift ring assembly 182 includes a short tubular ring 183 with a triangular or possibly circular cross section, and is guided by and is electrically connected to secondary cables 184 extending upwards from upper ring part 172 of docking station 166 to connect to lower ring 146 of tensioning balloon attachment frame 162. Tertiary cables 186 (Figs. 13, 14) extending upwardly from lift ring assembly 182 to the frame of a lower hoist assembly 198. Lift ring assembly 182 is guided by and derives electrical power from secondary cables 184 which are connected to docking station 166. Lift ring

assembly 182 is supported by tertiary cables 186 which are connected to a lower hoist carrier 200 which is the frame of lower hoist assembly 198. Referring to Fig. 14A, ~~a~~ carriage end gripper 196 is provided with a set of four orifices 195 through which secondary cables 184 freely pass, and a pair of orifices 197 through which tertiary cables 186 freely pass. Electrical power for ~~a~~ carriage end gripper 196 can be provided by secondary cables 184.

[00174] Tubular lift ring 183 has a set of inwardly extending guide structure elements or internal carriage guides 188 which are engaged in the respective three recesses 130 extending longitudinally in carriage 20 for maintaining the orientation of carriage 20 in tubular lift ring 183 and supplying power to carriage 20. Lift ring assembly 182 comprises tubular lift ring 183, a carriage pivoting assembly 189 which itself includes a pair of opposing pivot pins 190 and a rotational drive system 194, lift ring guides 192 and reversible traction drives 193. Rotation drive system 194 rotates tubular lift ring 183 which is pivotable about the horizontal axis defined by pins 190. The center of gravity of tubular lift ring 183 is made to fall in its geometric center which is co-incident with the axis of pins 190. Tubular lift ring 183 has a clamping or locking mechanism to permit it to be releasably attached to carriage 20 in such a manner that center of gravity 36 of carriage 20 is held on the axis of pins 190. The axis of rotation of reversible variable pitch thruster 31 is made parallel to the horizontal axis defined by pins 190. Tertiary cables 186 are respectively connected to the respective lift ring guides 192. Tertiary cables 186 are provided in two groups of cables of fixed length, and are attached to lower hoist carrier 200 180° apart, to connect carrier 200 to lift ring guides 192 below and assist in guiding the movement of carriage end gripper 196 (discussed below), and carries electrical power if needed.

[00175] Lift ring assembly 182 includes rotational drive system 194 to change the elevation angle indicated by the arrow P (Fig. 13) of tubular lift ring 183 and carriage 20 held thereby with respect to cables 184 and 186. Carriage end gripper 196 is also shown in Figs. 12, 13 and 14. Carriage end gripper 196 can be supported by a lower hoist cable 201 attached to lower hoist assembly 198 mounted on lower hoist carrier 200. Lower hoist cable 201 moves in the directions indicated by the arrow Q in Fig. 14. Carriage end gripper 196 is guided in motion by secondary cables 184 which carry electrical power, and supported by tertiary cables 186. Carriage end gripper 196 is able to releasably lock to the top of a carriage 20 by means of locking pins 204 which cooperate with pin lock receptacles 32 in the upper part of carriage 20. When carriage end gripper 196 is firmly connected to carriage 20, carriage end gripper 196 is able to lift or assist in lifting carriage 20 from docking station 166 and up through lift ring assembly 182 until center of gravity 36 of carriage 20 coincides with the horizontal pivot axis of lift ring assembly 182 defined by pins 190 when lift ring assembly 182 is lowered into contact with upper ring part 172 of docking station 166. The length of cables 186, which guides the motion of end gripper 196 must be long enough

to permit carriage 20 to rotate about the horizontal axis when end gripper 196 detaches from carriage 20 and is lifted a short distance out of engagement with docking assembly 166.

[00176] Lower hoist assembly 198 is fixed to the lower end of lower hoist carrier 200 as noted above, and also as noted above is used for lifting or assisting the traction drives 26 of carriage 20 in moving carriage 20 into and out of engagement with tubular lift ring 183. Lower hoist carrier 200 is raised and lowered as indicated by arrow R on hoist cables 202 from upper hoist 168 attached to tensioning balloon attachment frame 162 shown in Figs. 12, 13, and 14. Power is provided to hoist ~~168~~169 through secondary cables 184. Either three-phase current or direct current can be used to power hoist ~~168~~169. In the three-phase current system as shown, the group of four secondary cables 184, further identified (Fig. 14) from left to right as cable 184A is phase one of three, cable 184B is phase two of three, cable 184C is phase three of three and 184 D which may be used as an electrical neutral or as a duplicate of phase one of three. Also as noted earlier, lighter-than-air balloons 160 support the upper components of rocket launching system 1 and provide a significant portion of the tension required to keep primary cables 27 and secondary cables 184 in tension so as to make them taut, even with operational loads. As shown in Figs. 12, 13 and 14, tensioning balloon attachment frame 162 is disposed beneath lighter-than-air or tensioning balloons 160.

[00177] Referring to Figs. 1, 1B, 11, 15, 16, 17, 20A and 20B, these figures show a number of groups of smaller lighter-than-air balloons 164 or 164A used to relieve the self weight of cables 27 and associated support structures and spacer assemblies are shown. Balloons 164 are tapered and balloons 164A are cylindrical, although other shapes and configurations are possible and fall within the scope of the invention. Each of a number of large harnesses 206 having tensioning balloon holders 208 is attached to primary cables 27 by means of a three-sided lower spacer or stabilizer assembly 210. Each lower spacer assembly 210 is constructed and attached to primary cables 27 in the same manner as spacers 158 were constructed and employed as described earlier. Balloons 164 or 164A are respectively connected to balloon holders or attachment points 208 (Fig. 18). Lower spacer assembly 210 has three arms 211 forming an equilateral triangle as viewed in plan, arms 211 being parallel to respective arms 222 of large harness 206. Lower spacer assembly 210 has a connecting structure 214 at the respective intersections of arms 211, from which leads 215 extend. Each lead 215 from lower spacer assembly 210 extends for attachment to the respective balloon holders 208 of large harness 206. There are also provided a number of upper spacer or stabilizer assemblies 216 which, like spacer assemblies 210, separate primary cables 27 and further hold in place cable ties 218 and 219. Upper spacer assemblies are constructed and employed as are spacer assemblies 158 and lower spacer assemblies 210. Each upper stabilizer 216 has three arms 217 forming together in a plan view, an equilateral triangle, arms 217 being

parallel to respective arms 222. A cable connector 220 is at the intersection of the respective arms 217. Pairs of stabilizing ties 218 are connected at one end to a cable connector 220 at opposite ends of arms 217 and to tie holders 221 at the midpoint of arms 222 parallel to respective arms 217. Another set of cable leads 219 is connected between tie connectors 220 and balloon holders 208. This arrangement assists in holding harness 206 stably in place. Harnesses 206 are installed periodically with balloons 164 and 164A, respectively, along the length of primary cables 27 to compensate for the self weight of cables 27 and any attached structures, and to induce tension in the cables to assist in keeping them upright.

[00178] A specific assembly for connecting the various components of upper spacer 216 is as follows. Upper spacer assembly 216 and the items connected to them are shown in Figs. 15A, 15B and 15C. As noted above, upper spacer 216 is composed of three arms 217 forming an equilateral triangle. Referring to Figs. 15B and 15C, cable connector 220 comprises a base plate 902 having a central arm 904 and two arms 906 and 908 separated from central arm 904 by an angle exceeding 90°. Cable connector 220 further has a support portion 910 which is generally opposite arm 904. Base plate 902 is advantageously flat, and extending perpendicularly thereto is a cable connecting flange 912 which extends along the middle of support portion 910. A pair of arm support flanges 914 and 916 also extends perpendicularly from base plate 902 and are equiangularly spaced from cable connecting flange 912. Arms 904, 906 and 908 have lug-receiving holes 920, 918 and 922 respectively, extending perpendicularly through the respective arms 904, 906 and 908. Cable connecting flange 912 has a series of equally spaced, lug-receiving holes 924 extending along the height of flange 912.

[00179] Each cable 27 has at least one, and more likely many, connecting structures 925, each connecting structure 925 being composed of pairs of parallel, opposing, spaced flange-receiving connecting flanges 926, 927 which are parallel to the respective axes of cables 27. Flange 926 has parallel aligned columns of lug-receiving holes 928 and 930, which are aligned with corresponding holes 928, 930 on the other flange 927. In order to attach each cable connector 220 to a position on a respective cable 27, cable connecting flange 912 is inserted between flange-receiving connecting flanges 926, 927 with holes 924 in alignment with each of the respective holes 928. A set of lugs 932 is inserted into the respective aligned holes 928 and 924 and attached to a nut or other fastener receiver 933. To further connect respective cable connectors 220 to respective cables 27, similar ~~lugs~~bolts 256 as shown in Fig. 22 are used to clamp loops 244 of cable 27. Flange-receiving connecting flanges 926, 927 are close enough to each other to enable traction drives 26 to engage respective cables 27 as carriages 20 with traction drives 26 pass flanges 926 and 927 in full operative engagement with respective cables 27.

[00180] As noted earlier, pairs of stabilizing ties 218 connect cable connector 220 to

146 relative to upper rotating part 145. Similarly, the propulsive units on lower part 174, in conjunction with geared rotational drive system 147 (Figs. 13, 14), assist the rotation of the upper rotating part 172. Secondary cables 184 collected in two groups are attached opposite each other (180° apart) on lower rotating part 146. Upper hoist ~~168~~169 is attached to lower rotating part 146. Cables 184 connect balloon attachment frame 162 to docking station 166 (Figs. 13, 14) and carry electrical power as needed. Cables 184 also guide movement of lower hoist carrier 200, carriage end gripper 196 and lift ring assembly 182. Cables 184 are long enough to safely allow a period of downward acceleration at the local acceleration due to gravity of lower hoist carrier 200 and items suspended therefrom, sufficiently long for a rocket 18 to be disconnected from its restraint while in freefall conditions and boosted clear of carriage 20. An additional length of cables 184 to allow an additional period of time is also required for the deceleration for the rest of lower hoist carrier 200 and all items (including loaded or empty carriage 20) suspended therefrom. An additional length of cable would permit deceleration of a completely loaded carriage 20 to rest in the event of a short duration booster misfire.

[00191] As explained above and further discussed below, a means is required for securing items of system 1 to the various cables. Fig. 21 shows a cable 240 made of strands 242 of wire. Each strand 242 of cable 240 can have looped-out portions or loops 244 extending from the outer surface of the body of cable ~~27~~240 for securing items to cable ~~27~~240, while leaving the majority of the cable's outer surface unobstructed. Each loop 244 extends out from the body of each cable ~~27~~240 and returns into the body of cable ~~27~~240. For example, adaptive connector 247 is shown in Fig. 22 as discussed in detail hereafter. Adaptive connector 247 has an outstanding flange 248 having a series of bolt holes 249 and a further series of bolt holes 250 extending through a pair of parallel walls 252 extending in parallel form from a common base 253. Adaptive connector 247 can be urged against cable 27, with loops 244 slid between parallel walls 252 and their respective loop holes 254 in alignment with holes 250. A bolt 256 can be extended through loop holes 254 and bolt holes 250 to secure adaptive connector 247 to cable 27 and a nut can be put on respective bolts 256 to effect a firm connection. A top view is shown in Fig. 23. Alternatively, parallel walls 255 separated by a spacer 259 as an alternative adaptive connector 257 can be used, as shown in the top view of Fig. 24. Cable 27 can be gripped by a pair of traction ~~drives~~drive wheels 26A of carriages 20 as shown in Fig. 25, rotating in opposite directions O_1 and O_2.

[00192] In order to use the rocket launch system 1 described thus far, rockets 18 are loaded in carriages 20, respectively in one of the apparatus as shown in Fig. 5, and transported along pathway 15 with a lateral conveying device 46. Lateral conveying device 46 is secured to elevating assembly 60 using the respective tapered alignment pins 142 and fractional rotation

twist lock pins 144 and their respective cooperating alignment pin sockets 152 and fractional rotation twist lock pin sockets 154, as explained with respect to Fig. 9. Secondary cables 184 and primary cables 27 are held taut by means of tensioning balloons 160 and balloons 164, respectively, with balloons 164 contributing to the tension in primary cables 27. Tension to the cables below is transferred via tensioning balloons attachment frame 162 and cable separation and further tension is achieved via large harnesses 206, spacers 158 and spacer 228 (Figs. 11, 15 and 18).

[00193] Each carriage 20 is rotated into alignment with internal carriage guides 133 and loaded into lower guide tube 124 (Fig. 8). The upper part of lower guide tube 124 is then tipped into engagement with the lower part of secondary guide structure 125 (Fig. 10) until lower guide tube 124 engages stop 132 to align carriage guides 133 and 138 as discussed earlier. The traction drives 26 are then used to drive carriage 20 up cable 27 through docking station 166 into its upper part 172 and partially into lift ring assembly 182, which is lowered by use of hoist ~~168~~169 so that lift ring assembly 182 engages with upper part 172 of docking station 166 (Figs. 13, 14). End gripper 196 is lowered and properly attached to the upper end of carriage 20. Lower hoist assembly 198, powered by current in secondary cables 184 transferred from cables 27, lifts carriage 20 further into engagement with lift ring assembly 182 such that the combined centers of gravity of lift ring assembly 182, carriage 20 and rocket 18 coincide with the pivot axis of lift ring assembly 182. Lower hoist 198 thus assists traction drives 26 which engage internal carriage guides 180A and 180B in lifting carriage 20 upwardly relative to docking station 166. Then carriage end gripper 196 disengages locking pins 204 from pin lock sockets 32 of carriage 20 and is lifted minimally clear by use of lower hoist assembly 198. Lift ring assembly 182 is guided by secondary cables 184 and supported by tertiary cables 186. Hoist ~~168~~169 lifts carriage 20 further until the lower end of carriage 20 is no longer within the lower part 174 of docking station 166 and is only within upper part 172. Geared rotational drive system 147 within lower docking station 166 and geared rotational drive system 177 with tensioning balloon frame 162 now rotate all components in a coordinated manner between ring bearings 176 and 149 into a direction suitable for launching rocket 18. Thrusters 148 and 178 operate simultaneously to keep the lower part 174 of docking station 166 and, upper ring 145 of tensioning balloons attachment frame 162 from rotating (Fig. 14).

[00194] Hoist ~~168~~169 next lifts carriage 20 entirely out of engagement with docking station 166 (carriage 20 holding rocket 18 must be lifted higher and higher according to their combined weight) and as high as required into the middle of short tubular ring 183 for the safe launch of rocket 18. Rotary drive system 194, in coordination with reversible variable pitch thrusters 31 extended 90°, rotates short tubular ring 183 with carriage 20 into an appropriate angle with respect to the horizontal suitable for launch. Reversible variable pitch thrusters 31 are being used

to assist rotary drive system 194 and to prevent carriage 20 from oscillating about horizontal axis through pins 190. When carriage 20 is at the desired elevation angle for launch and stable, reversible variable pitch thrusters 31 are rotated further about their hinges to avoid contact with hot rocket gases.

[00195] Variations are possible to assist rotary drive system 194. This includes the positioning and stabilizing of carriage 20 in lift ring assembly 182, and in particular to prevent the oscillation of carriage 20 about pivot pins 190. Referring to Figs. 13B-13C, there can be provided at both ends of carriage 20 ~~a~~ reversible variable pitch thruster 31 and a pair of accompanying hub motors 822. Each thruster 31 and hub motor 822 can be housed in one end of carriage 20 beneath an end cover 830. Each thruster 31 has a set of rotatable blades 826 that are mounted in a pivotable thruster mounting 828 at both ends of carriage 20. Each mounting 828 is mounted on a hinge assembly 829 and is movable between a rest position (shown in dotted lines in Fig. 13C and an active position parallel with the longitudinal axis of carriage 20 (shown in Fig. 13C in solid lines) by means of a hydraulic actuator 832, which pivots about an actuator pivot 834. When thrusters 31 are in their active position, an airstream is created as shown by arrows U. This prevents oscillation of carriage 20. Hub motors 822 are reversible since the airstream can go in both directions. Likewise, the pitch of blades 826 is variable to vary with variance of the ambient air in which blades 826 are rotating. However, when the engine of rocket 18 ignites, thrusters 31 can be moved at an obtuse angle as shown in dotted lines at the left-hand part of Fig. 13C to avoid the short duration booster exhaust. The upper end of thruster 31 is also moved to its obtuse position to enable the loading of a rocket 18 into carriage 20. It should be noted that the inside of carriage 20 has ~~a~~ continuous pressure-and-heat resistant tube 836 running from end-to-end to contain a rocket 18 therein. A set of three or more centering supports 840 maintain the centering of each reversible, variable pitch thruster 31.

[00196] The upper end of hoist cable 202 (Fig. 14) is fed out from upper hoist 168 and reversible traction drives 193 of lift ring assembly 182 begin to drive downwards, while in operative engagement with secondary cables 184. Hoist cable 202 unreels and moves lift ring assembly 182, carriage 20, rocket 18 and all other components supported by cable 202 downwards assisted by drives 193 to overcome friction and air resistance, so that they are in freefall at an acceleration of 1g, and rocket 18 becomes weightless with respect to carriage 20. There is a slight friction maintained in upper hoist 168 to maintain control during freefall, and to avoid any slack and any uncontrolled unwinding of cable 202. Prior to freefall, retractable end covers 30 (Figs. 9, 9C, 13, 13A) of carriage 20 are opened (or end covers 830 shown in Fig. 13C are opened). Retractable arms 34 or 35 (Fig. 26) inside of carriage 20, which had been holding rocket 18 in carriage 20, are retracted (as discussed below), and the short duration booster rocket

apparatus.

[00208] A lift ring 382 drives up or down in the direction shown by arrows Z on cables 184. Lift ring 382 includes reversible traction drives 386, and a structure 387 for holding carriage 20 which is able to pivot in the direction indicated by arrow AA and a rotary drive 381 to change the angle of lift ring 382 and carriage 20. An upper docking station 388 has an upper part 390 normally held stationary and a lower part 392, being rotatable in directions shown by arrows BB about a vertical axis using rotary drive 381. A ring bearing 394 reduces the friction from such rotation. A minimum set of three reaction force thrusters 397 counters the tendency of upper parts 390 to rotate about the vertical axis.

[00209] A rigid elevator shaft or elevator tube 396 may carry special carriages 398 each having a telescope CC built within, to a top mount 399. A special lightweight carriage or carriages 20A could also be used for transporting carriage 20 up elevator tube 396 to mount 399 after transfer from lift ring 382. A set of electricity carrying cables or rails could be mounted on the inside of elevator tube 396 which the wheels of carriages 398 or 20A would engage and also receive electric power (as did wheels of traction drives 26 which engaged cables 27), to enable the transport of carriage 20A up and down the inside of elevator tube 396. Balloon(s) 160 are attached to or surround elevator tube 396 as described earlier to provide sufficient tension to cables 184 to enable the transport of lift ring 382 with special carriage 398 holding telescope CC therein, as well as to support the cables themselves and the apparatus attached to the cables.

[00210] Telescope top mount 399 includes a turret-like platform 402 upon which is disposed a rotatable turntable 404, which rotates with respect to stationary upper part 390. A telescope-receiving hole 405 extends through platform 402 and turntable 404 as shown in Figs. 28A and 29. Mounting walls 406 extend from turntable 404. A telescope-holding structure or ring 408 clamps special carriage 398 with telescope CC therein, with the center of gravity of carriage 398 disposed in the center of ring 408 which acts in the same manner as lift ring assembly 182 but without traction drives. As shown in detail in Fig. 29, ring 408 has coaxial pivot pins 410 which extend into sockets 412 of mounting walls 406. Mounting walls 406, ring 408 and pivot pins 410 for a telescopic tilting structure 411 are provided. Therefore, carriage 398 and telescope CC mounted within it can be tilted in elevation as desired, and the rotation in azimuth shown by arrow DD of turntable 404 directs carriage 398 and telescope CC included in any desired direction. Turntable 404 and platform 402 may be made independently rotatable in the respective opposite directions shown by arrows HH and II (Figs. 28A, 29) with respect to elevator tube 396. This rotation is effected by means of a rotary drive 383, similar to drive 381. Platform 402 may have radially adjustable weights to make its rotational moment of inertia equal to the rotational moments of inertia of the assembly of turntable 404 and parts above it so that when they are

conscious and be able to remain active while in an upright posture in a high acceleration environment. For extended operations, this is achieved by immersing the occupant in a fluid of approximately the same density as the body, within a rigid suit with external electro-mechanical or hydraulic, servo-assisted, constant volume joints. Space suit 605 has a helmet 650 (Figs. 34, 34A, 34B, 36) surrounding the head of person GG, and a rigid outer shell 648. An inner suit 651 lies close to person GG, and an internal face mask 653 with a visor 655 is sealed to inner suit 651. A nontoxic fluid 656 (Figs. 34, 34A ~~34C, 36~~ 34B) such as water fills the space between rigid outer shell 648 and inner suit 651. If fluid 656 is heated to a comfortable temperature, inner suit 651 may be omitted. There is a double seal 654 between inner suit 651 and face mask 653. Inner suit 651 could be skin tight around person GG, and face mask 653 could be ventilated to or from an air supply via an air supply tube 661. A leakage canal 652 is provided on face mask 653 of space suit 605 for draining water if there is leakage into the space between the double seals surrounding the face of person GG. Water or other appropriate nontoxic fluid 656 fills the space between inner suit 651 and outer shell 648, and face mask 653 and visor 655 as shown in Figs. 34, 34A and 34B. Person GG in space suit 605 can turn his head within helmet 650 while suspended in water 656. Space suit 605 is of rigid lightweight construction; however, volumetric airflow sensors in face mask 653 or visor 655 could be provided to direct a hydraulic or electro-mechanical drive piston (explained below) to move in and out to match the change of volume due to breathing. Additionally, in order to match the breathing rate, that is, the change of volume divided by the change in time, pressure sensors at various places (particularly near the chest) in space suit 605 keep the liquid pressure constant by directing the piston in and out. The use of external high pressure hydraulic power assistance to permit person GG to move about freely in suit 605 in high acceleration environments such as exist during launch or re-entry avoids the possibility of water or other hydraulic fluid used to activate the joints of the suit from escaping into the suit's interior which could crush occupant GG.

[00216] With respect to the piston, reference is also made to Fig. 35. Here, space suit 605 has water (or nontoxic fluid ~~of an~~ approximating the density of the human body) 656 filling the suit around person GG, and a piston 657 moves in and out of a cylinder 660, powered by high pressure hydraulic fluid or direct actuation of piston 657 by electro-mechanical apparatus to vary the volume in suit 605 as required for normal respiration.

[00217] The rigid outer shell 648 is typical of the construction of suit 605 depicted in Fig. 34 and is shown in Fig. 36. Rigid outer shell 648 of suit 605 includes a pair of rigid sleeves, each containing internal sleeves 664 (only one is shown) each of which is made from open, elastic webbing or a soft, open pore foam or webbing and a pair of rigid legs each having internal legs of the same construction as internal sleeves 664. The internal sleeves and internal legs will

What is claimed is:

1. A rocket launch system comprising:

a set of electric power lines for carrying electrical power from a remote electrical power system on earth, the electric power being continuously withdrawable along said set of electric power lines, said set of power lines having a low end portion for being positioned at a low altitude and a high end portion for extending into high altitudes;

a set of rocket-transporting device lines for transporting a rocket-transporting device between a low altitude and a high altitude, said rocket-transporting device lines having a low end portion for being positioned at a low altitude and a high end portion for extending into high altitudes; and

lighter-than-air balloons connected to said sets of power lines and said rocket-transporting device lines for holding said sets of power lines and said carriage transporting lines upwards to a high altitude.

2. A rocket launch system according to claim 1 wherein the respective power lines of said set of electric power lines and the respective rocket transporting device lines of said set of rocket-transporting device lines are integrally combined into a power and transporting primary cable forming part of a set of power and transporting primary cables.

3. A rocket launch system according to claim 2 wherein said set of power and transporting primary cables are three in number for carrying three-phase electrical power.

4. A rocket launch system according to claim 2 wherein said lighter-than-air balloons are operatively attached to said set of power and transporting primary cables intermittently along the length of said set of power and transporting primary cables to support cumulatively said set of primary cables, and any other structure carried by said set of power and transporting primary cables.

5. A rocket launch system according to claim 2 and further including sets of spacer assemblies located intermittently along said set of power and transporting primary cables, each of said set of spacer assemblies having cable-engaging structure for engaging respective ones of said set of power and transporting primary cables to maintain a spaced separation between said respective power and transporting primary cables in said set of power and transporting primary set of cables, and wherein said lighter-than-air balloons are respectively, operatively connected to at least one of said spacer assemblies.

6. A rocket launch system according to claim 2 and further comprising a docking station operatively connected to said set of power and transporting primary cables at a terminal position along the length of said set of power and transporting primary cables, said docking station being structured to receive a rocket-transporting device as part of a preparation for a launch of a rocket being transported in a rocket-transporting device.

7. A rocket launch system according to claim 6 and further comprising power and guiding secondary cables operatively attached to said docking station and being extendable to a higher altitude than the altitude of said docking station, said rocket launch system further comprising lighter-than-air balloons operatively connected to said power and guiding secondary cables for holding and tensioning said power and guiding secondary cables aloft above said power and transporting primary cables.

8. A rocket launch system according to claim 7 and further comprising a lift ring assembly in operative engagement with said power and guiding secondary cables for deriving electrical power from and being guided by said power and guiding secondary cables, said lift ring assembly being positionable above said docking station and being operatively engageable with a rocket-transporting device disposed in said docking station for lifting the rocket-transporting device out of said docking station and having a ~~carriage~~rocket-transporting device pivoting assembly for being tilted to a desired rocket launch angle.

9. A rocket launch system according to claim 8 wherein said ~~carriage~~rocket-transporting device pivoting assembly is a tubular lift ring ~~assembly~~ configured to surround and operatively engage a rocket-transporting device, and being tiltable to orient the rocket-transporting device and the rocket disposed in the rocket transporting device to a desired launch angle.

10. A rocket launch system according to claim 9 and further comprising:

a lower hoist assembly located above said lift ring assembly when said rocket launch system is in operation, a set of supporting tertiary cables extending from said lower hoist assembly for being operationally connectable to and supporting said lift ring assembly, and a rocket-transport device end gripper disposable between said lower hoist assembly and said lift ring assembly and being operatively attached to said lower hoist assembly, said end gripper being releasably and lockably engageable with a rocket-transport device in said lift ring assembly, said lower hoist assembly lifting said end gripper for lifting a rocket-transporting device into engagement with said carriage pivoting assembly prior to the launching of a rocket from a rocket-transporting device disposed in said lift ring assembly.

11. A rocket launch system according to claim 1 and further comprising a rocket-transporting device for transporting a rocket along said rocket-transporting device lines, said rocket-transporting device including:

~~respective rocket transporting devices each having a~~ traction drives for driving ~~structure and~~ said rocket-transporting device along said rocket-transporting device lines, said traction drives comprising:

an electrically powered energizing apparatus for ~~energizing said driving structure, said electrically powered driving apparatus operatively engaging said set of electric power lines for drawing~~deriving electrical power from said set of electric power lines~~, and~~ when said ~~driving structure operatively engaging~~traction drives require energy to cause said rocket-transporting device to travel upwards on said rocket-transporting device lines~~; said electrically powered driving apparatus energizing~~, and for supplying electrical power to said ~~driving structure, said driving structure driving said respective rocket transporting devices along said set of~~electric power lines when said electrically powered energizing apparatus generates more electric power than said traction drives require while said rocket-transporting device travels downwards on said rocket-transporting device lines.

12. A rocket launch system according to claim 11 wherein the respective power lines of said set of electric power lines and the respective rocket-transporting device lines of said set of rocket-transporting device lines are integrally combined into a power and transporting primary cable forming part of a set of power and transporting primary cables, said respective rocket-transporting devices being driven along said set of primary cables by said ~~driving structure~~traction drives upon energization by said energizing apparatus.

13. A rocket launch system according to claim 12 wherein each of said respective rocket-transporting devices is a respective carriage having an interior compartment configured to contain a rocket, the rocket being ejectable from said interior compartment during launch.

14. A rocket launch system according to claim 13 wherein said set of power and transporting primary cables are three in number and carry three-phase power, and said electrically powered energizing apparatus is powered by three-phase electrical power.

15. A rocket launch system according to claim 13 wherein said ~~driving structure comprises~~traction drives comprise a set of traction ~~drives~~drive wheels associated with said respective ~~carriages~~carriage for engaging said respective primary cables of said set of power and transporting primary cables for transporting said respective ~~carriages~~carriage along said set of power and transporting primary cables.

16. A rocket launch system according to claim 13 wherein said lighter-than-air balloons are operatively attached to said set of power and transporting primary cables intermittently along the length of said set of power and transporting primary cables to support cumulatively said set of power and transporting primary cables, and any other structure supported by said set of power and transporting primary cables.

17. A rocket launch system according to claim 16 and further including sets of spacer assemblies located intermittently along said set of power and transporting primary cables, each of said set of spacer assemblies having cable engaging structure for engaging respective ones of said set of power and transporting primary cables to maintain a spaced separation between said respective primary cables, and wherein said lighter-than-air balloons are respectively, operatively connected to at least one of said spacer assemblies.

18. A rocket launch system according to claim 15 and further comprising a docking station operatively connected to said set of power and transporting primary cables at a terminal position along the length of said set of power and transporting primary cables, said docking station being structured to receive one of said respective carriages as part of a preparation for a launch of a rocket being transported in said carriage.

19. A rocket launch system according to claim 18 and further comprising power and guiding secondary cables operatively attached to said docking station and extendable to a higher altitude than the altitude of said docking station, said rocket launch system further comprising

primary tensioning lighter-than-air balloons operatively connected to said power and guiding secondary cables for holding said power and guiding secondary cables aloft above said power and transporting primary cables.

20. A rocket launch system according to claim 19 and further comprising a lift ring assembly in operative engagement with said power and guiding secondary cables for deriving electrical power and being guided by said power and guiding secondary cables, said lift ring assembly being positioned above said docking station and being operatively engageable with said respective carriages disposed in said docking station for lifting said respective carriages out of said docking station, said lift ring assembly comprising a tubular lift ring and ~~having~~ a carriage pivoting assembly for ~~being tilted~~tilting said tubular lift ring to a desirable rocket launch angle.

21. A rocket launch system according to claim 20 wherein said ~~carriage pivoting assembly~~tubular lift ring is a hollow apparatus configured to surround and operatively engage said respective carriage, and being tiltable to orient said respective carriage and the rocket in said respective carriage in a desired launch direction.

22. A rocket launch system according to claim 21 and further comprising a lower hoist assembly from which are extendable a set of supporting tertiary cables for being operationally connectable to and supporting said lift ring assembly, and a carriage end gripper disposable between said lower hoist assembly and said lift ring assembly and being operatively attached to said lower hoist assembly, said carriage end gripper being releasably lockably engageable with one of said respective carriages in said lift ring assembly, said lower hoist assembly lifting said carriage end gripper for lifting said carriage into proper engagement with said carriage pivoting assembly prior to the launching of a rocket from said carriage disposed in said lifting ring assembly.

23. A rocket launch system according to claim 13 wherein said lighter-than-air balloons are operatively attached to said set of power and transporting primary cables intermittently along the length of said primary cables to support cumulatively said primary cables, and any other structure supported by said primary cables.

24. A rocket launch system according to claim 13 wherein said carriage includes a continuous pressure and heat resistant tube for holding a rocket, said tube preventing dangerous exhaust gases from leaving said carriage through any side of said carriage.

25. A rocket launch system according to claim 1 wherein said lighter-than-air balloons are operatively attached to said set of electric power lines and to said set of rocket-transporting device lines intermittently along the length of said respective sets of power and rocket-transporting device lines to support cumulatively said respective sets of lines, and any other structure supported by said respective sets of lines.

26. A rocket launch system according to claim 20 and further including a tensioning balloons attachment frame connected to said secondary cables, said primary tensioning lighter-than-air balloons being attached to said tensioning balloons attachment frame for imparting sufficient tension to support cumulatively at least one of said respective carriages, secondary cables and any other structure supported on said tensioning balloons attachment frame below said attachment frame.

27. A rocket launch system according to claim 26 wherein said ~~lift ring assembly comprises a carriage pivoting assembly for being tilted to a desired rocket launch angle, and wherein said~~ rocket launch system further comprises:

a lower hoist assembly operatively attached to said tensioning balloons attachment frame located above said lift ring assembly when said rocket launch system is in operation, a set of supporting tertiary cables extending from said lower hoist assembly for being operatively connectable to and supporting said lift ring assembly, and a carriage end gripper disposed between said lower hoist assembly and said lift ring assembly and being operatively connected to said lower hoist assembly, said carriage end gripper being releasably and lockably engageable with one of said respective carriages in said lift ring assembly, said lower hoist lifting said carriage end gripper for lifting one of said respective carriages into engagement with said carriage pivoting assembly prior to the launching of a rocket from said carriage disposed in said lift ring assembly; and

an upper hoist assembly attached to said tensioning balloon attachment frame and being operatively connected to said lower hoist assembly and to said power and guiding secondary cables, said upper hoist assembly drawing power from said power and guiding secondary cables for selectively raising and lowering said lower hoist carrier assembly to lift or assist in lifting one of said respective carriages into and out of engagement with said lift ring assembly.

28. A rocket launch system according to claim 26 wherein said docking station has connected thereto an upper ring part having an axis of rotation, a lower ring part coaxial with said upper ring part, said upper ring part and said lower ring part being connected together by a lower ring bearing, said upper ring part and said lower ring part being rotatable relative to each other, and a lower rotational drive system for driving said upper ring part and said lower ring part in counter rotation about said lower ring bearing and wherein said tensioning balloons attachment frame has connected thereto an upper ring having an axis of rotation, a lower ring coaxial with said upper ring, said upper ring and said lower ring being connected together by an upper rotary ring bearing, and an upper rotational drive system for driving said upper ring and said lower ring in counter rotation about said upper rotary ring bearing; said upper rotational drive system and said lower drive system being operatively connected to each other to coordinate the rotation of

said upper ring part and said lower ring to rotate as a unit to keep said associated cables from twisting around each other, said lower ring part and said upper ring rotating as a unit to counter wind-induced rotation and rotation resulting from the rotation of one of said respective carriages when the lower end of said carriage is held in said upper ring part and said respective carriage is being rotated for launch.

29. A rocket launch system according to claim 28 wherein said upper rotational drive system includes upper force thrusters for rotating or assisting in the rotation of said upper rotational drive structure, and wherein said lower rotational drive system includes lower force thrusters for rotating or assisting the rotation of said lower rotational drive system.

30. A rocket launch system according to claim 28 wherein each of said respective carriages ~~has~~have a longitudinal axis and external radial recesses extending along said respective carriage, said upper ring part and said lower ring part of said docking station are coaxially aligned to define an interior space for receiving and passing therethrough one of said respective carriages, said docking station having internal carriage guides for carrying electrical power to said traction drives and for entering said radial recesses to keep the respective carriages in proper alignment and stable while supplying electrical power to said respective carriages.

31. A rocket launch device according to claim 30 wherein said respective carriages have a triangular cross section with corner edges with said radial corner recesses extending along said corner edges; said lift ring assembly being supported by said tertiary cables, said lift ring assembly comprising a tubular lift ring with a triangular cross section for receiving one of said respective carriages, said tubular lift ring having inwardly extending internal carriage guides engageable with said radial recesses of said respective carriages for maintaining the orientation of said respective carriages in said tubular lift ring, said tubular lift ring having a longitudinal axis coincident with the longitudinal axis of said carriage, the angle of said longitudinal axis relative to ground is the elevation angle of said tubular lift ring.

32. A rocket launch system according to claim 31 wherein said ~~tubular lift ring comprises a~~ carriage pivoting assembly ~~for pivoting~~tilts said tubular lift ring with respect to said secondary cables.

33. A rocket launch system according to claim 32 wherein a pair of said tertiary cables is on opposite sides of said tubular lift ring, and wherein said carriage pivoting assembly comprises:

a rotational drive system operatively connected to said tubular lift ring for rotating said lift ring;

lift ring guides operatively connected to said tertiary cables; and

pivot pins connected to and extending from said tubular lift ring, said pivot pins being

pivotally attached to each of said lift ring guides;

wherein said rotational drive system rotates said tubular lift ring to pivot about said pivot pins to change the elevation angle of said tubular lift ring and any of said respective carriages received thereby.

34. A rocket launch system according to claim 33 wherein the center of gravity of said tubular lift ring falls in the geometric center of said tubular lift ring, said center of gravity being coincident with the axis of said pivot pins.

35. A rocket launch system according to claim 34 wherein said tubular lift ring includes a clamping mechanism for the releasable clamping of said respective carriages with the center of gravity of said last-mentioned respective carriage being disposed on the axis of said pivot pins.

36. A rocket launch system according to claim 35 wherein said tertiary cables comprise two groups of cables of fixed length, said tertiary cables being connected to said lift ring guides to attach said lower hoist carrier assembly to said lift ring guides, said tertiary cables being 180° apart where said tertiary cables are attached to said lower hoist carrier assembly.

37. A rocket launch system according to claim 35 wherein said carriage end gripper includes a set of four orifices for allowing said secondary cables extending between said docking station and said rotational drive system to freely pass.

38. A rocket launch system according to claim 37 wherein said carriage end gripper further include a pair of orifices for allowing said tertiary cables extending between said lift ring assembly and said lower hoist assembly to pass.

39. A rocket launch system according to claim 3 wherein said lighter-than-air balloons provide tension to said power and transporting primary cables to enable said primary cables to function with a rocket-transport device disposed on said respective lines.

40. A rocket launch system according to claim 39 and further comprising at least one large harness having interconnected arms ~~attached to tensioning~~and balloon holders on said large harness for attachment to said lighter-than-air balloons, said tensioning balloon holders being attached to said power and transporting primary cables to provide said tension.

41. A rocket launch system according to claim 40 and further incorporating at least one lower spacer assembly for separating said power and transporting primary cables from each other and attaching said respective tensioning balloon holders to said respective large harnesses and to said respective balloons.

42. A rocket launch system according to claim 39 wherein said lighter-than-air balloons are selected from the group consisting of tapered balloons or any cylindrical balloon.

43. A rocket launch system according to claim 41 wherein said at least one large

harness has three arms forming an equilateral triangle, and said at least one lower spacer assembly comprises three-sided lower spacer arms forming an equilateral triangle parallel to the respective arms of said respective large harnesses, said at least one lower spacer assembly having lower spacer assembly-connecting structure at the juncture of respective lower spacer arms, and said ~~at least one~~ rocket launch system further comprises lower spacer harness leads connecting said respective lower spacer assembly-connecting structure with said respective tensioning balloon holders.

44. A rocket launch system according to claim 43 and further incorporating an upper spacer assembly having three arms forming an equilateral triangle having structure at the respective intersections of said three arms for separating said power and transporting primary cables from each other.

45. A rocket launch system according to claim 44 and further including upper spacer assembly cable ties connecting the opposite ends of said respective three arms to said three arms of said respective large harnesses, and tension ties interconnecting said respective intersections of said three arms of said upper spacer assembly to the respective intersections of said three arms of said respective large harnesses.

46. A rocket launch assembly according to claim 45 wherein said upper spacer assembly comprises three upper spacer arms forming an equilateral triangle with arms parallel to the respective arms of said respective large harnesses, and said rocket launch system further comprises upper spacer connecting structure disposed at the intersection of the respective upper spacer arms, and upper spacer connecting ties interconnects said respective upper spacer connecting structure and said opposite ends of said arms of said respective large harnesses.

47. A rocket launch system according to claim 46 wherein said arms of said upper ~~harness~~spacer assembly further include tie holders at the midpoint of said respective arms, and said rocket launch system further includes cable leads interconnecting said upper spacer connecting structure of said arms of said upper harness assembly and said tie holders of said respective arms of said respective large harnesses.

48. A rocket launch system according to claim 47 wherein said at least one large harness comprises at least one additional large harness installed periodically along the length of said set of primary cables with said lighter-than-air balloons attached thereto to compensate for the full weight of said primary cables.

49. A rocket launch system according to claim 47 and further including a further upper spacer assembly for separating said power and transporting primary cables from each other.

50. A rocket launch system according to claim 49 and further including further upper assembly cable ties connected to said further upper spacer assembly and said upper harness.

51. A rocket launch system according to claim 50 wherein said further upper spacer assembly comprises three further upper spacer arms forming an equilateral triangle with arms parallel to the respective arms of said respective large harnesses, and said rocket launch system further comprises further upper spacer arms connecting structure disposed at the intersection of the respective further upper spacer arms, and a set of further upper spacer connecting ties interconnects said respective further upper spacer connecting structure and said opposite ends of said arms of said respective large harnesses.

52. A rocket launch system according to claim 40 and further including large harness reaction thrusters operatively connected to said at least one large harness for orienting said docking station, said lift ring assembly and said carriage end gripper to be oriented with respect to vertical to compensate for wind forces and for the deflation of any of said lighter-than-air balloons.

53. A rocket launch system according to claim 52 and further including position sensors for controlling the direction and force of said large harness reaction thruster.

54. A rocket launch system according to claim 53 wherein one of said reaction thrusters is disposed at the intersection of each of the respective arms of said at least one large harness.

55. A rocket launch system according to claim 54 wherein each of said reaction thrusters comprises a fan mounted within a fan housing.

56. A rocket launch system according to claim 55 and wherein said rocket launch system further includes a pair of arms disposed at the intersection of said respective arms of said at least one large harness, and coaxial pins having a coaxial axis extending into said respective fan housings for enabling said respective fan housings to pivot about said respective coaxial axes in clockwise and counterclockwise directions.

57. A rocket launch system according to claim 56 wherein said rocket launch system further includes respective rotatable support joints mounted at said respective tensioning balloon holders, and said respective reaction thrusters are pivotably and rotatably gimbaled electric thrusters for orienting said docking station, said lift ring assembly and said carriage end gripper with respect to vertical to compensate for wind forces and for deflation of any of said lighter-than-air balloons.

58. A rocket launch system according to claim 51 and further including stabilizing straps attached to said respective lower spacer assembly~~, upper spacer assembly~~ and ~~further~~ to said upper spacer assembly to prevent said respective primary cables from touching said respective lighter-than-air balloons.

59. A rocket launch system according to claim ~~50~~58 and further including a stabilizer

connected intermittently to each of said primary cables between said primary cables and said respective lighter-than-air balloons, said respective stabilizers including respective connecting members for connecting said respective stabilizers to said respective stabilizing straps.

60. A rocket launch system according to claim 59 wherein each of said respective stabilizers is composed of three stabilizing arms which collectively intersect to form an equilateral triangle.

61. A rocket launch system according to claim 60 wherein a pair of stabilizing straps is attached to said respective connecting members, said respective pairs of stabilizing straps form various angles, and wherein said rocket launch system includes strap connectors attached to said lighter-than-air balloons for enabling said stabilizing straps to contact said respective lighter-than-air balloons longitudinally.

62. A rocket launch system according to claim 4 and further including at least one large harness for being operatively attached to said lighter-than-air balloons, said rocket launch system further including basal connectors extending from said respective large harnesses to said respective lighter-than-air balloons to connect said lighter-than-air balloons to said respective large harnesses, said respective basal ~~connection~~connections being tangent to said respective lighter-than-air balloons.

63. A rocket launch assembly according to claim ~~10~~22 wherein said carriage pivoting assembly is in a freefall condition upon the launch of a rocket, and wherein said secondary cables are of sufficient length to safely allow a time period of sufficient length at the local acceleration due to gravity of lower hoist assembly with any items suspended therefrom, to be sufficiently long after a rocket is launched, and said secondary cables being free and clear of a rocket-transport device supported by said secondary cables while said carriage pivoting assembly is in the freefall condition.

64. A rocket launch system according to claim ~~10~~22 wherein said carriage pivoting assembly is in a freefall condition upon the launch of a rocket, and wherein said secondary cables are of sufficient length to safely allow a time period of sufficient length at the local acceleration due to gravity of said lower hoist assembly with a rocket-transport device having a rocket disposed therein in the event of a misfire while said tilting structure is in the freefall condition.

65. A rocket launch system according to claim 2 wherein said power and transporting primary cable is a body of cable composed of strands of wire having looped-out portions extending from said body of cable for securing items to said primary cable, each looped-out portion exiting from and returning to said body of said primary cable.

66. A rocket launch system according to claim 65 and further including an adaptive connector having aligned wall orifices therein, and a connector for extending through a pair of said aligned orifices and one of said looped-out portions for connecting said adaptive connector to

and said secondary guiding structure are internal carriage guides for being received by the set of external recesses in the respective rocket-transporting devices.

71. A rocket launch system according to claim 69 wherein one of said turntable and said turntable base has a perimetrical portion and a flat surface, and a vertical, annular flange extending from said perimetrical portion and a horizontal, annular flange extending from said vertical, annular flange and having ~~on~~an upper, lower and radial surfaces of said vertical, annular flange rotatable about respective radial axes; and wherein wheels are mounted for engagement by said turntable and said turntable base;

and the other of said turntable and said turntable base has a vertical, annular, tubular part concentric with the other of said turntable and said turntable base and ~~an~~a horizontal, annular flange extending from ~~said vertical, annular tubular part,~~ said vertical, annular tubular part, said horizontal, annular flange and said other of said turntable and turntable base having surfaces for engagement by said respective wheels for reducing the friction between said turntable and said turntable base upon the relative rotation thereof.

72. A rocket launch system according to claim 69 wherein said turntable and said turntable base each has a perimetrical end portion for receiving a ~~ball~~rolling bearing, and a vertical, annular flange extending from said perimetrical portion and a horizontal, annular flange extending from said vertical, annular flange and having annular bearing ~~grooves~~surfaces for receiving ~~ball~~rolling bearings;

and the other of said turntable and said turntable base having a vertical, annular, tubular part concentric with the other of said turntable and said turntable base and a horizontal, annular flange extending from said vertical, annular, tubular part, having annular bearing ~~grooves~~surfaces; and

~~ball~~rolling bearings disposed between said horizontal, annular flange and both of said annular, horizontal flanges and said horizontal, annular flange in said annular bearing ~~grooves~~surfaces;

said ~~ball~~rolling bearings reducing the friction between said turntable and said turntable base upon the relative rotation therebetween and resisting axial compressive and tensile forces as well as forces perpendicular to the axis of rotation and combinations thereof.

73. A rocket launch system according to claim 69 wherein said turret assembly further comprises:

a yoke including a pair of spaced apart arms pivotally mounted on said turntable, said lower guide tube pivotally mounted between said pair of arms, said lower guide tube and said secondary guide structure being pivotally mounted between said pair of arms, the axes of rotation of said turntable and said lower guide tube intersecting orthogonally.

74. A rocket launch system according to claim 73 wherein said integral tube is located at a fixed distance from the common pivot of said integral tube and lower guide tube, said secondary guide tube structure being counterbalanced about the horizontal pivot of said secondary guide structure, said secondary guide structure being alignable with the upper end of said lower

guide tube to render said integral tube and said lower guide tube coaxial, and said secondary guiding structure and said lower guide tube guiding structure in alignment.

75. A rocket launch system according to claim 69 wherein the respective rocket-transport devices have electrically powered traction drives for engaging said respective primary cables for transporting the respective rocket-transporting devices, and lower guide tube guiding structure and said secondary guiding structure are electrically ~~powered~~energized to transmit electrical power to said traction drives.

76. A rocket launch system according to claim 69 and further including an elevating assembly for elevating a rocket-transport device into said turret assembly, said elevating assembly for engaging the respective rocket-transport devices for moving the respective rocket-transport devices into said turret assembly.

77. A rocket launch system according to claim 76 wherein said rotatable turntable has an orifice for receiving respective rocket-transport devices, and said elevating assembly comprises:

a hydraulic cylinder;

a hydraulic piston operatively disposed inside said hydraulic cylinder;

a hydraulic piston rod connected to said hydraulic piston and being axially movable with respect to said hydraulic cylinder;

an upper swiveling assembly operatively mounted on said hydraulic piston for receiving the respective rocket-transporting devices and aligning the rocket-transporting devices with said rotatable turntable orifice; and

a rotary drive for rotating said upper swiveling assembly.

78. A rocket launch system according to claim 77 wherein said upper swiveling assembly comprises:

a rotatable bed for receiving the respective rocket-transporting devices and rotating the transporting devices to align the respective rocket-transporting devices with said rotatable turntable orifice.

79. A rocket launch system according to claim 78 wherein said upper swiveling assembly further comprises a table portion mounted on said rotatable bed for receiving for further conveyance respective rocket-transporting devices.

80. A rocket launch system according to claim 79 wherein said elevating assembly further comprises a non-rotating bed fixed to said piston rod; said rotatable bed being mounted on said non-rotating bed.

81. A rocket launch system according to claim 80 wherein said upper swiveling assembly receives respective rocket-transporting devices from lateral conveying devices having a

fractional rotation twist-lock pins for securely and releasably attaching the respective rockets to said elevator assembly.

96. A rocket launch system according to claim 92 wherein said transverse loader further comprises stabilizing arm assemblies mounted on said elevator assembly for engaging and stabilizing the respective rockets disposed in said elevator assembly.

97. A rocket launch system according to claim 96 wherein said stabilizing arm assemblies comprise arms with structure for engaging the respective rockets, and actuators attached to said respective arms for operating said respective arms to engage and release the respective rockets.

98. A rocket launch system according to claim 87 and further comprising lateral conveying devices for conveying rocket-transporting devices between said rocket storage structure, said assembly bays and said table portion, said lateral conveying device comprising wheels for operatively engaging said set of tracks ~~and said tracks.~~.

99. A rocket launch system according to claim 98 wherein the respective rocket-transporting devices have a base end proximal a rocket contained in the respective rocket-transporting devices, and said lateral conveying device further comprises receiving structure for stably receiving the base end to hold the respective rocket-transporting devices in an upright position, and a locking mechanism for releasably locking a rocket-transporting device in said receiving structure.

100. A rocket launch system according to claim 99 wherein said locking mechanism comprises fractional rotation twist-lock pins.

101. A rocket launch system according to claim 99 wherein said lateral conveying device has independently steerable wheels and a steering mechanism for moving said lateral conveying device on said set of tracks.

102. A rocket launch system according to claim 101 and further including loading apparatus for loading rocket-transporting devices onto said lateral conveying device, said loading apparatus comprising:

a loading bed rotatable about an axis of rotation for receiving a rocket-transporting device; and

a rotator operatively connected to said loading bed for rotating said loading bed from a holding position for holding a rocket-transporting device on said loading bed to a release a release position for enabling the rocket-transporting device to be displaced to a respective one of said receiving structures of said lateral conveying devices in an upright position.

103. A rocket launch system according to claim 97 and further comprising a main pathway extending in operative proximity to said rocket storage structure and said assembly bays, and rails disposed in said main pathway upon which lateral conveying devices can move for

transporting rocket-transporting devices.

104. A rocket launch system according to claim 103 and further including bay pathways leading from said respective assembly bays to said main pathway and rails in said bay pathways for operative intersection with said rails in said main pathway.

105. A rocket launch system according to claim 104, wherein said assembly bays are located below ground surface, and have the shape of an inverted frustum and made of a concrete material for limiting the effects of damage due to the detonation of rocket propellant by deflecting the blast upwardly and laterally.

106. A rocket launch assembly according to claim 105 and further including slidable blast covers slidable over said respective assembly bays for protecting against damage in the event of an accidental blast in said bay.

107. A rocket launch according to claim 76 wherein said elevating assembly comprises an electro-mechanical elevating assembly.

108. A rocket launch system according to claim 13 wherein said carriage comprises opposed end openings, and end covers at said respective end openings to protect the interior of said respective carriage and any rocket contained in said respective carriage from the weather.

109. A rocket launch system according to claim 108 wherein said end covers are retractable membranes.

110. A rocket launch system according to claim 108 wherein at least one of said end covers is movable between open and closed positions to open and close said at least one end opening.

111. A rocket launch system according to claim ~~13~~208 wherein said ~~driving structure comprises a set of reversible~~ traction drives comprise a set of traction drive wheels associated with said respective carriages for engaging said respective primary cables of said power and transporting primary cables for both transporting said respective carriages along said set of power and transporting primary cables, ~~and for~~said set of traction drive wheels being operatively connected to said reversible electrically powered energizing apparatus, said traction drives serving as regenerative brakes ~~and for converting kinetic energy of~~ when said respective carriages ~~into electricity for being fed back to~~move along said primary cables ~~for assisting~~under the ~~raising~~influence of ~~other respective carriages along~~gravity to effect the delivery of electrical power to said primary cables.

112. A rocket launch system according to claim 13 wherein said respective carriages have receptacles for being used to lift said respective carriages into components of said rocket launch system.

113. A rocket launch system according to claim 112 wherein said receptacles are pin lock receptacles.

114. A rocket launch system according to claim 13 wherein said carriages have internal retractable arms having an active condition for holding a rocket securely within said respective

carriages, and being retracted to an inactive condition to enable launch of the rocket from said carriage.

115. A rocket launch system according to claim 114 wherein said retractable arms hold a rocket with the center of gravity of the rocket being coincident with the center of gravity of said respective carriage.

116. A rocket launch system according to claim 13 wherein said carriage has three sides defining in cross section a triangle, each side intersecting two other sides to form three intersections, and said carriage further comprises external recesses at said intersections for being guided in respective components of said rocket launch system.

117. A rocket launch system according to claim 13 wherein said ~~respective carriages~~traction drives comprise a set of traction ~~drives~~wheels associated with the respective carriages for engaging primary cables of said set of power and transporting primary cables for transporting the respective carriages along said set of power and transporting primary cables, said traction ~~drives~~wheels comprising ~~longitudinal mechanisms having~~ opposing cylindrical wheels having annular grooves for partially enveloping primary cables on which said respective ~~carriages ride, and said carriage deriving power from the respective~~carriage rides, wherein said electrically powered energizing apparatus is a reversible electrically powered energizing apparatus, said reversible electrically powered energizing apparatus derives electrical power from said set of electrical power lines when said set of traction drives lift said respective carriage along said set of primary cables, and said reversible electrically powered energizing apparatus reversibly delivers electrical power to said set of electrical power lines when said traction drives move said respective carriage under the influence of gravity to descend said set of primary cables.

118. A rocket launch system according to claim 117 ~~and further comprising~~wherein said reversible electrically powered energizing apparatus comprises a motor ~~generators~~generator operatively coupled with said respective ~~traction~~cylindrical wheels for being electrically powered by said rotating ~~traction~~cylindrical wheels as said respective carriage descends said set of primary cables.

119. A rocket launch system according to claim 114 wherein the rockets for loading in said carriage has a set of slots, and said retractable arms have head members, said retractable arms having an active position wherein said respective head members enter the respective slots in the rockets to hold the rockets securely in said respective carriages, and an inactive position wherein said stem and head member are retractable from the respective slots to enable launch of the rockets.

120. A rocket launch system according to claim 119 wherein said carriage comprises a pressure-and-heat resistant tube having a cavity for holding said retractable arms and protecting doors movable between an open position enabling movement of said retractable arms to hold a rocket, and a closed position to protect said retractable arms.

121. A rocket launch system according to claim 120 wherein said pressure-and-heat resistant tube has a cavity-covering end door with an airflow detector for pivoting between an open position for assisting in enabling said retractable arm to hold a rocket, and a closed position for assisting in protecting said protecting doors and said cavity.

122. A rocket launch system according to claim 121 wherein said cavity includes pivot pins for

mounting said end door for pivoting between said open and closed positions.

fins and an aerodynamic spike with a disc serving as a forward shockwave initiator.

147. A rocket launch system according to claim 13 and further comprising a rocket being launched from said carriage, structure for holding an occupant, and a space suit for being worn by the occupant, said space suit being capable of holding a ~~fluid~~liquid for accommodating G-force effects.

148. A rocket launch system according to claim 147 wherein structure is provided for holding the person in an upright position.

149. A rocket launch system according to claim 147 wherein the said space suit has a helmet with a rigid outer shell, an inner suit for laying close to the occupant wearing said space suit to separate the occupant from the ~~fluid~~liquid, and a face mask fixed to said inner suit.

150. A rocket launch system according to claim 147 wherein said space suit has a helmet and a face mask.

151. A rocket launch system according to claim 150 and further including a heating apparatus for heating a ~~fluid~~liquid in said space suit.

152. A rocket launch system according to claim 150 and further including ventilating apparatus for connecting with an air supply.

153. A rocket launch system according to claim 150 and further including a leakage canal for draining fluid from said face mask.

154. A rocket launch system according to claim 148 and further comprising an electro-mechanical piston apparatus and a cylinder for operatively holding said piston apparatus, said piston apparatus being movable in and out of said cylinder, said piston apparatus being operated by electro-mechanical apparatus for controlling the volume of ~~fluid~~liquid in said suit for normal respiration.

155. A rocket launch system according to claim 150 wherein said suit further includes a rigid outer shell with a sleeve, said sleeve being composed of a soft material.

156. A rocket launch system according to claim 155 wherein said soft material is selected from the group consisting of elastic webbing, soft open-pore foam and soft open-pore webbing.

157. A rocket launch system according to claim 155 and further including elastic tendons, each tendon being attached to said suit and being tangent to said sleeve and being attached to said sleeve.

158. A rocket launch system according to claim 157 wherein said space suit has powered joints for at least some of the joints of an occupant wearing said space suit, and wherein said rocket launch system has structure for sensing the tension in said respective tendons for providing feedback to direct said powered joints of said space suit to mirror the motions of the

occupant wearing said space suit to keep the occupant centered in said space suit.

159. A rocket launch system according to claim 13 and further including a rocket for launching from said carriage, and an aerospace plane attached to the body of said rocket, said aerospace plane having folded lift and directional control structures attached to the body of said aerospace plane, said aerospace plane having wings movable between folded and unfolded positions under the control of said folded lift and directional control structures.

160. A rocket launch system according to claim 13 and further including a rocket for launching from said carriage, and a lifting-type re-entry vehicle, said lifting-type re-entry vehicle having folded lift and directional control structures having folded and unfolded configurations.

161. A rocket launch system according to claim 13 and further including a rocket for launching from said carriage, said rocket having a payload protected by aerodynamic shells, said aerodynamic shells being detachable after said rocket has left the earth's atmosphere following the launch of said rocket and said payload has entered space.

162. A rocket launch system according to claim 2 wherein said cables have a steel exterior.

163. A rocket launch system according to claim 2 wherein said cables have a steel exterior, and an interior composed of copper-coated steel strands.

164. A rocket launch system according to claim 13 wherein the rockets to be transported by said respective carriages ~~has~~have at least one fin, and said respective carriages have an internal support for holding the respective rockets, said internal support has slots for receiving the respective ~~rockets~~at least one rocket fin and holding ~~them~~the respective rockets stable in said carriage.

165. A rocket launch system according to claim 3 and further including at least one spacer assembly for maintaining a spaced separation between said three power and transporting primary cables, said primary cables having an adaptive connector comprising a pair of spaced, parallel flanges extending generally radially from said primary cables at the same level for each of said three primary cables, said spacer assembly comprising:

three generally straight arms forming a generally equilateral triangle, said three generally straight arms being generally coplanar and forming an intersection on opposite ends of said respective straight arms;

an orthogonal flange disposed at said respective intersections and being generally perpendicular to the plane of said three generally straight arms and disposed between said respective pairs of spaced, parallel flanges extending from said respective primary cables; and

attaching structure for attaching said respective orthogonal flanges and said respective pairs of spaced, parallel flanges extending from said primary cables.

166. A rocket launch system according to claim 38 and further comprising:

said carriage to an active position parallel to the longitudinal axis of said carriage.

173. A rocket launch system according to claim 172 wherein said thruster mountings are rotatable about opposite ends of said carriage between said rest position, said active position, and an obtuse position away from the openings of said respective ends to avoid the impingement of exhaust gases of rockets being launched from said carriage and to enable loading a rocket into said carriage.

174. A docking station for use in a rocket launching system, the rocket launching system including a set of primary electrical power and transporting cables for extending upwardly into high altitudes and operatively connected to said docking station, a set of secondary electrical power and transporting cables for extending further upwardly into high altitudes and operatively connected to said docking station and a rocket transporting device movable along the set of primary and secondary electrical power and transporting cables, said docking station comprising:

structure for receiving one of the rocket transporting devices in preparation for the launch of a rocket carried by the rocket transporting device; and

rotating apparatus for controlling the rotation of said docking station to prevent the twisting of the sets of primary and secondary cables when said docking station is located in a high altitude.

175. A docking station according to claim 174 wherein the rocket launch system includes upper rotational systems connected to the set of secondary electrical power and transporting cables, and wherein said rotating apparatus comprises an upper ring part having an axis of rotation, a lower ring part coaxial with said upper ring part, said upper ring part and said lower ring part being connected together and rotatable relative to each other, and a lower rotational drive system for driving one of said upper ring part and said lower ring part in counter rotation, said lower rotational drive system being operatively connected to the upper rotational drive system to coordinate the relative rotation of said lower ring with said upper drive system to keep the second set of secondary cables from twisting around each other.

176. A docking station according to claim 175 wherein said lower rotational drive system includes lower force thrusters for rotating or assisting the rotation of said lower rotational drive system.

177. A lift ring assembly for use in a rocket launching system, the rocket launching system including a set of primary electrical power and transporting cables ~~for~~engageable by rocket-transporting devices traveling along said respective cables and deriving electrical power from said electrical cables to energize the rocket-transporting devices, said cables extending upwardly into high altitudes for transporting and powering respective rocket-transporting devices, a docking-station connected to the set of primary electrical power and transporting cables for receiving the rocket-transporting devices and putting the received rocket-transporting devices in proper alignment and rendering the received rocket-transporting devices stable for subsequent transporting of the rocket-transport devices into higher altitudes, and a set of secondary electrical power and guiding cables for extending upwardly into higher altitudes from the docking station for transporting and powering respective rocket-transporting devices, the

docking station receiving respective rocket-transporting devices from the set of primary electrical power and transporting cables in preparation of the launch of a rocket carried by the respective rocket transporting devices; said lift ring assembly being in operative engagement with the set of secondary electrical power and guiding cables for deriving electrical power and being guided by the set of secondary electrical power and guiding cables, said lift ring assembly being positionable above the docking station and operatively engageable with a rocket transporting device disposed in the docking station for lifting the rocket transporting device out of the docking station, said lift ring assembly having a carriage-pivoting assembly for being tilted to a desired rocket-launch angle.

178. A lift ring assembly according to claim 177 wherein the carriage-pivoting assembly is a tubular lift ring configured to surround and operatively engage a rocket transporting device, and being tiltable to orient the rocket transporting device and the rocket disposed in the rocket transporting device to a desired launch angle.

179. A rocket launch system according to claim 20 and further comprising a lower hoist assembly located above said lift ring assembly when said rocket launch system is in operation, a set of supporting tertiary cables extending from said lower hoist assembly for being operationally connectable to and supporting said lift ring assembly, and a rocket transport device end gripper disposable between said lower hoist assembly and said lift ring assembly and being operatively attached to said lower hoist assembly, said end gripper being releasably and lockably engageable with a carriage in said lift ring assembly, said lower hoist assembly lifting said end gripper for lifting a rocket transporting device into engagement with said carriage pivoting assembly prior to the launching of a rocket from a carriage disposed in said lift ring assembly.

180. A rocket transporting ~~device~~system for use in a rocket launching system, the rocket launching system having a set of power and transporting cables, said rocket-transporting ~~device configured~~system configured to provide electrical power to said power and transporting cables to transport and eject a rocket to be launched and comprising:

~~electrically energizeable driving~~ an electrical energy provider disposed on the earth for directing electrical energy to said rocket launching system, said electrical energy provider including the set of power and transporting cables;

at least one rocket transporting device having traction drives, said traction drives comprising electrically powered energizing apparatus operatively engageable with the set of power and transporting cables for deriving electrical power from the set of power and transporting cables and transporting ~~a~~said rocket-transporting device along the set of power and transporting cables~~; and.~~

~~a driving structure being energized by said electrically energizeable driving apparatus.~~

181. A rocket-transporting device according to claim 180 wherein the set of power and transporting cables of the rocket launching system are three in number and carry three-phase power, said rocket transporting system being configured to provide three-phase electrical power, and said electrically ~~energizeable driving~~powered energizing apparatus is powered by the three-phase electrical power.

182. ~~A~~At least one rocket transporting device according to claim ~~177~~180 wherein said at least

one rocket transporting ~~devices are carriages respectively~~device is a carriage having an interior compartment configured to

contain a rocket, the rocket being ejectable from said interior compartment during launch.

183. A carriage according to claim 182 wherein said ~~driving structure comprises~~traction drives comprise a set of traction ~~drives~~drive wheels for engaging the respective power and transporting cables to be energized by said respective cables for transporting said carriage upwardly along the set of power and transporting cables.

184. A carriage according to claim 183 ~~wherein said set of traction drives are~~and further comprising a reversible ~~traction drives~~electrically powered energizing apparatus for ~~both~~deriving electrical power from said set of power and transporting cables when said carriage is transported upwardly along said set of power and transporting cables, and for ~~serving as regenerative brakes and for converting kinetic energy~~reversibly delivering electrical power to said set of power and transporting cables when said set of traction drives moves said carriage ~~into electricity to be fed back~~under the influence of gravity to descend said set of power and transporting cables.

185. A carriage according to claim 182 and further comprising at least one internal retractable arm movable between an active condition for holding a rocket in the interior compartment of said carriage, and an inactive condition for not holding a rocket.

186. A carriage according to claim 185 wherein said at least one internal retractable arm holds a rocket in which the center of gravity of the rocket being coincident with the center of gravity of said carriage.

187. A carriage according to claim 182 wherein said carriage has three sides defining in cross section a triangle.

188. A carriage according to claim 182 ~~and further comprising longitudinal mechanisms having opposing~~wherein said set of traction drive wheels comprises opposing cylindrical wheels, said cylindrical wheels having annular grooves for partially enveloping the respective cables for transporting said carriage on the respective cables ~~and for deriving electrical power from the respective cables.~~.

189. A carriage according to claim 183 wherein said respective traction ~~drives~~drive wheels are rotatable traction ~~wheels, and wherein said carriage further comprises a motor-generator operatively coupled to said traction~~drive wheels ~~for being electrically powered by rotation of said traction wheels.~~.

190. A carriage according to claim 185 and further comprising a pressure-and-heat resistant tube having a cavity at normally ambient pressure for holding said at least one retractable arm, and protecting doors movable between an open position enabling movement of said at least one retractable arm to hold a rocket, and a closed position to assist in protecting said protecting doors and said cavity.

191. A carriage according to claim 190 wherein said at least one retractable arm comprises:

a base member mounted in said cavity for moving said at least one end door retractable arm between said active and said inactive positions;

a head member; and

a stem connecting said base member to said head member;

and wherein said carriage further comprises:

a weatherproof cavity covering end door; said at least one retractable arm being movably coupled

to said

cavity covering end ~~door~~doors; and

a hydraulic cylinder movably coupled to each of said at least one retractable arm for moving said at least one retractable arm between the active and inactive conditions;

said hydraulic cylinder moving said retractable arm to the inactive condition in response to movement of said cavity covering end ~~door~~doors to the open position to enable launch of a rocket from said carriage, and moving said retractable arm to the active condition in response to movement of said end ~~door~~doors to the closed ~~position to hold the rockets securely in said respective carriage~~positions.

192. A turntable mechanism configured for receiving respective rocket-transporting devices and for delivering the respective rocket-transporting devices to a launch assembly, the launch assembly having power and transporting cables for conveying the respective rocket transporting devices along the cables, the cables having a low portion and an elevated portion, said turntable mechanism comprising:

a turntable base; and

a turret assembly mounted on said turntable base, said turret assembly being connected to the low portion of the power and transporting cables;

the launch assembly further having transporting structure for transporting respective rocket transporting devices from and to said turret assembly along the power and transporting cables.

193. A turret assembly according to claim 192 and further comprising:

a rotatable turntable rotatable with respect to said turntable base;

a lower guide tube mounted on said rotatable turntable, said lower guide tube having a lower guide tube orifice for receiving respective rocket-transporting devices and lower guide tube guiding structure for locating the respective rocket-transporting devices in said lower guide tube orifice;

a secondary guide structure comprising an integral tube having an integral tube orifice and secondary guiding structures alignable with said lower guide tube guiding structure, and primary cable connecting structure for connecting the primary cables to said secondary guide structure; and

a rotating assembly for rotating said lower guide tube with respect to said secondary guide structure to align said lower guide tube orifice and said integral tube orifice, and to align said lower guide tube guide structure and said secondary guide structure;

said rotatable turntable rotating said lower guide tube and said secondary guide structure in a desired direction for the movement of a respective rocket-transporting device.

194. A turret assembly according to claim ~~93~~193 wherein the respective rocket-transporting devices have respective longitudinal axes and a set of external recesses extending along the length

of the respective rocket-transporting devices, and said lower guide tube guiding structure and said secondary guide structure ~~are~~have internal carriage guides for being received by the set of external recesses in the respective rocket-transporting devices.

195. A turret assembly according to claim 193 wherein said rotatable turntable has an orifice for receiving respective rocket-transporting devices, and said turret assembly further comprises:

a yoke including a pair of spaced apart arms pivotally mounted on said turntable, said lower guide tube and said secondary guide structure being pivotally mounted between said pair of arms for pivoting with respect to said yoke, the axes of rotation of said turntable and said lower guide tube intersecting orthogonally.

196. A turret assembly according to claim 193 wherein the respective rocket-transport devices have electrically powered traction drives for engaging the respective primary cables for transporting the respective rocket-transporting devices, and said lower guide tube guiding structure and said secondary guiding structure are electrically powered to transmit electrical power to the traction drives.

197. A space suit to be worn by an occupant riding in a rocket at high altitudes or in space, said suit comprising:

a set of joints at at least some of the joints of an occupant wearing said suit, said set of joints being lockable in an optimally aerodynamic position with respect to the rocket for launch, wherein the occupant wears said space suit and is loaded feet first onto the top of the rocket for resisting the G-force effects of the rocket during launch.

198. A space suit according to claim 197 and further including structure for unlocking said set of joints in response to cessation of the operation of the rocket.

199. A space suit to be worn by an occupant riding in a rocket at high altitudes or in space, said suit having porous pads for being filled with ~~fluid~~liquid, said porous pads being substantially fillable with ~~fluid~~liquid during launch to space and during re-entry to cool by evaporation the exterior of said suit during re-entry to the low altitude from the high altitude.

200. A space suit to be worn by an occupant riding in a rocket at high altitudes, said suit comprising an ablative exterior material with thermal insulation.

201. A space suit comprising:

a helmet;

a body suit comprising:

a rigid outer shell;

an inner suit; and

~~a nontoxic fluid filling~~ an interior portion between said outer ~~suit~~shell and said inner suit, said interior portion

capable of holding a liquid;

a nontoxic liquid filling said interior portion; and

heat-maintaining apparatus for heating said nontoxic ~~fluid~~liquid to a temperature level

comfortable to a wearer of said space suit.

202. A space suit according to claim 201 wherein said ~~heat-maintaining apparatus is an inner suit for laying close to a wearer's body, said~~ nontoxic ~~fluid being~~liquid is located between said inner suit and said rigid outer shell.

203. A space suit according to claim 201 wherein said heat-maintaining apparatus is a heating or cooling and circulation apparatus.

204. A space suit according to claim 201 ~~and further comprising a helmet,~~wherein said helmet ~~comprising~~comprises:

~~a~~ an outer helmet shell;

an interior face mask sealed against the face of the occupant of said space suit;

an air supply tube connecting said interior face mask and said outer helmet shell;

a visor;

a seal between said inner suit and said face mask;

a nontoxic ~~fluid~~liquid between said visor and said face mask; and

a ventilator for said face mask.

205. A space suit according to claim 204 and further including a leakage canal for draining ~~fluid~~liquid from said helmet if ~~fluid~~liquid leakage occurs.

206. A space suit according to claim 201 and further including volume-changing structure for changing the volume of said ~~fluid~~liquid according to the breathing of the wearer, said volume-changing structure comprising a powered piston and cylinder apparatus for regulating said ~~fluid~~liquid in said space suit, and piston ~~powering~~powered apparatus for regulating the operation of said piston according to the respiration of the wearer.

207. A space suit according to claim 201 wherein said rigid outer shell includes rigid shell arms, rigid shell legs and rigid shell torso for receiving the arms, legs and torso of the wearer and further comprising:

internal sleeves for receiving the respective body, arms and legs of the wearer, said internal sleeves being made of a soft material not impeding significantly the flow of said ~~fluid~~liquid through said internal sleeves, said internal sleeves extending throughout the interior of said respective rigid shell arms ~~and~~, the rigid shell legs and the rigid torso;

said internal sleeves and said rigid shell arms, said rigid shell legs and said rigid shell torso having powered joints;

elastic tendons tangent to said respective internal sleeves and connected to said rigid shell arms ~~and~~, said rigid shell legs and said rigid shell torso for maintaining the arms ~~and~~, legs and body of the wearer centered in said respective rigid shell arms, rigid shell legs and ~~legs~~rigid shell torso; and

electronic apparatus operatively connected to said powered joints and to said elastic tendons for sensing the tension in said elastic tendons and feeding measurements of the sensed tension to said powered joints to direct said powered joints to mirror the motion of the wearer.

208. A rocket launch system according to claim 11 wherein said electrically powered energizing

apparatus is a reversible electrically powered energizing apparatus for deriving electrical power from said set of electrical power lines when said traction drives lift said rocket-transporting device along said set of rocket-transporting device lines, and said reversible electrically powered energizing apparatus reversibly delivers electrical power to said set of electrical power lines when said traction drives move said rocket-transporting device under the influence of gravity to descend said set of rocket-transporting device lines.