ABSTRACT OF THE DISCLOSURE

Tightwire sports equipment includes a pair of single post standards and a tightwire stretched therebetween and secured thereto. The standards penetrate the ground and, optionally, have sheet metal stampings forming at each pole (a) a ground penetration limiting annulus and (b) a platform partly supported by the wire and partly supported by the pole. The wire, optionally, has a coating to increase friction.

CROSS REFERENCES

Cross-referenced patent applications by the same inventor and under the same titles are:
(a) S.N. 749,336, filed Aug. 1, 1968
(b) S.N. D. 13,751, filed Sept. 27, 1968

BRIEF SUMMARY OF THE INVENTION AND OBJECTIVES

My invention concerns improvements in tightwire sports equipment, and particularly concerns a construction using single posts at each end.

Whereas the specific embodiments of tightwire sports equipment shown in my prior patent applications work very well, it is desirable to provide a modified construction for a lower priced market, of less cost due to reduction in metal used, simplification of manufacture, etc. In fact, in the stripped down construction shown in FIGS. 1–4 herein, just about all structure is deleted except that essential to provide an operative tightwire, whereas some desirable but not essential structure is added in FIGS. 5–11. The keynote of the economy in construction is the use of a single post standard at each end of the tightwire, as compared to the double post standard at each end of the tightwire shown by my prior patent applications. The objectives of my invention include the provision of lower cost tightwire sports equipment and enhance the design of structure only requiring one post for the standard at each end of the tightwire. It is an additional objective to provide a low cost platform associated with each standard and to provide low cost ground penetration limits for each standard.

A tightwire is best walked upon with tennis shoes or the like. Street shoes (hard rubber or leather soled) may slip on the wire. It is an objective of my invention, as a precaution in the use of street shoes contrary to instructions, to provide a coating on the tightwire (cable) providing a higher coefficient of friction than bare metal wire rope.

My invention will be best understood, together with additional objectives and advantages thereof, from the following description, read with reference to the drawings, in which:

FIG. 1 is a perspective view of tightwire apparatus forming a specific embodiment of my invention.

FIG. 2 is an enlarged side view of one of the end portions of the tightwire.

FIG. 3 is an enlarged, fragmentary side view of the portion of a standard to which a tightwire is secured.

FIG. 4 is a fragmentary view, partly in section, taken on line 4–4 of FIG. 3.

FIG. 5 is an enlarged cross-section of the wire taken on line 5–5 of FIG. 3.

FIGS. 6–11 are views of a modified construction in which a penetration limiting annulus and a platform are provided for each standard.

FIG. 6 is a fragmentary perspective view of the lower end of a standard.

FIG. 7 is a view partly in section taken on line 7–7 of FIG. 6.

FIG. 8 is a fragmentary view partly in section taken on line 8–8 of FIG. 7.

FIG. 9 is a fragmentary perspective view of the portion of a standard associated with a platform.

FIG. 10 is a side view of the platform which is covered, in the figure, with a pad.

FIG. 11 is a perspective view of the platform viewed from below.

I have referenced my prior patent applications and will not include herein all of the background material which was appropriate for the first patent application but would be unnecessarily repetitive in this improvement patent application. In general, to the best of my knowledge, I am the first to realize the possibility and potential of providing a tightwire as a common item of sport-play-recreation equipment, as distinguished from professional usage of a tightwire in a circus, etc. Part of this realization is associated with low height and the low height not only makes this a suitable safe piece of play-sports equipment but also has other implications. For example, note in the drawings at this low height that no steps have to be provided to the wire (FIG. 1) or to the platform (FIG. 9). I consider eighteen inches to be about an ideal height above ground G for the ends of the tightwire, and this should be taken as the height depicted in the drawings. Under the weight of a user, the height in the center may be taken advantage of about eleven inches.

When the expressions "tightwire," "cable," etc., are used, the words, unless limited by context, should be taken as including various applicable tension members, although usually the tightwire will be metal wire rope 10 as exemplified shown in FIG. 5. The cable string starts at one ground anchor 12 and turnbuckle 14 and extends clear to the opposite turnbuckle 14 and anchor 12. In other words, there is no break in cable 10 at the standards 16. The continuous string not only avoids the cost of ending and securing two cable ends (tightwire and guying wire) at each standard, but also avoids the safety-failure problem that would be involved if the cable string had to have six securing loops instead of only two securing loops 18. As indicated in FIG. 2, the cable loops 18 are secured by two cable clamps 20, 22 to an eye or a hook 24 on turnbuckle 14. The other end of turnbuckle 14 is a hook 26 that fits in an eye 28 at the upper end of ground anchor 12. These parts, their sizes and strengths, etc., are more completely covered in my prior mechanical patent application. Note that ground anchor 12 depicted is a common item of manufacture and includes a helical blade 30 screwed into the ground G. This form of ground anchor has proven to be quite satisfactory. When it is said that standard 16 is a "post" or "a single post-like body," this would be inclusive of tube or rod shape bodies, or metal shapes such as angle irons or channels or the T-section used in metal fence posts, etc. It simply excludes two or more post-like bodies at each end or the use of fabricated structures not post-like.

The effort in FIGS. 1–4 was to devise a structure of bare minimum cost to serve the basic purpose of a sports tightwire. It is a relatively simple design (being, in effect, merely two posts 16, a cable 10, and end securing and tightening means), but the design problem was not easily solved, i.e., simplicity is often surprisingly diffi-
cult to achieve in design. One has to start this design process with the premise that very high cable forces are involved, i.e., it is expected that forces in pounds will run into the tens of thousands and that the wire and anything used thereof. This high loading suggests any standard would have to be at least the size of a large fence post and would have to be heavily guyed in the three basic directions, if a post were to be used. It is only with considerable thought, and perhaps experimentation and prototype experience, that it is realized that forces on a post other than the vertical vector are small if the cable is fixedly secured to the post 16 (as by the U-bolts and nuts 32 here). If the cable were not secured to the post, horizontal vectors would become larger, for example, in the tendency of the post to tip in the vertical plane of the cable as cable 10 is tensed.

In the proportions shown in the drawings, post-standard 16 can be taken as being a 2' metal tube, 4' above the wire (to a height readily grasped by the hands of a user standing on the wire), 18' between the wire and the ground and 30' buried in the ground. It will be understood that a 2' tube and a 30' ground penetration are small, when dealing in pounds force in four figures. In fact, 24' or less ground penetration is feasible. Part of the design conception is to realize that the force vectors to bend the tube (or to bend the upper portion of the tubing) are smaller than the force vectors to tilt the tube (or to tilt the tube in the ground) are not great if the post 16 is permitted quite limited pivoting in the ground. In other words, if standard 16 is regarded as an absolutely rigid body that must remain with its axis absolutely vertical, then the structure shown in FIG. 1 will not do. On the other hand, when it is realized that some working of the tube 16 in the ground is not harmful, then one starts to realize the feasibility of the FIG. 1 construction. Considering (a) a first case in which tightwire 10 is fully tensed but not in use and (b) a second case in which a user is on the wire and may even be giving it a bouncing action, then it is realized that large changes occur in some force vectors, but this problem is neatly solved in the FIG. 1 structure by flexibly securing the wire 10 to the post 16 and letting the post 16 pivot slightly as force vectors change.

A part of this conception is also to realize that the side vectors (force vectors outside of the vertical plane which includes wire 10 and standard 16) are small. Any platform added, such as in FIG. 9, should be relatively symmetrical regarding said plane or, more basically, the weight of any user on any such platform should not be too unsymmetrically disposed, etc.

In the foregoing that the structure shown in FIGS. 1-4 will, unobviously, fulfill all basic functions and requirements of sports tightwire, although it is stripped of almost all features not fundamentally required. For example, the wire is low enough so that no step is needed to get up on the wire, at least as long as there is an upper standard portion 40 above the wire to hold onto. When the wire is mounted, of course it would be easier to have a platform, but upper standard 40 serves the purpose of a stabilizer against falling until the user starts out on the wire beyond reach of the standard.

Not all structures of FIG. 1 is functionally absolutely necessary. Whereas, as above related, the upper portion 40 of the tube 16 is the way the wire is handy in getting up on the wire, in holding onto until the user walks away from the standard, and in grasping when the user returns to the standard, the tube 16 could stop at the wire, and the apparatus would provide an operative tightwire. However, I consider portion 40 to be necessary from a safety viewpoint. If the user starts to fall near the standard, upper portion 40 gives him something to grab to avoid striking the standard or any platform used. Note in the middle of the wire there is nothing to strike but the grass (outdoors on a lawn) in falling and it is only near the standards that one could fall on a metal body.

FIG. 5 shows a representative metal wire rope 46 having a coating 48. As mentioned before, the user of the tightwire should wear tennis shoes or other than street shoes. Coating 48 is a precaution in case street shoes are used, giving the cable 10 higher friction than bare wire rope, i.e., in effect the friction is provided on the tightwire in case it is not provided by the shoe. To the extent of my knowledge, tightwires have not been provided before composed of metal wire rope with a coating thereon of higher coefficient of friction than the bare metal wire rope. In the prior professional usage of tightwires, of course the performers are suitably clad on their feet, so that extra friction is not needed on the wire. Coating 46 can be formed from various organic materials such as plastics or rubbers and those skilled in the art of coatings will understand the selection and application of a number of suitable coatings. One material is simply a latex coating.

Friction tape, of course, illustrates a tacky coating but on a production basis the general class of applicable coatings is non-slip coatings, for example the 3M Scotch Brand Non-Slip Coating No. 1420. It is preferable to have less of a "sandpaper" quality than Coating 1420 to avoid abrasion in case the foot should slip and the skin of a leg slip across the surface. A coating without such abrasiveness in the field of working tie to a portion of the ground (or to tilt the tube in the ground) is Clad Protective Coating 1706. Both Products 1420 and 1706 are in the class of Protective Coatings but Product 1240 has higher anti-skid characteristics. Surface irregularity, i.e., abrasiveness, and tackiness are both recognized in the literature to be related to coefficient of friction, and it will be understood here that tackiness is more acceptable than excessive roughness. To an extent, wear resistance and coefficient of friction can be inversely related, which can result in a need to recoat the wire periodically if a coating is used without high enough wear resistance. Wire ropes are manufactured with various plastic coatings, i.e., nylon. One company providing a variety of plastic-coated cables is MacWhyte Company, Kenosha, Wis. Most of these plastics will have higher coefficients of friction than bare metal wire rope.

In FIGS. 1 and 2, construction 16 is driven into the ground (and this is even aided by beveling the lower end at 50 at a 45' angle) and any tendency for the tube to work further into the ground during use is merely compensated for by periodically further tightening turnbuckles 14. Of course this can be more or less of a problem, or even no problem at all, depending on the type of soil. FIGS. 6-8 show an economical solution to limiting ground penetration by forming an annular flange about the tube 16 at the ground level. An annular flange can be provided by a casting or could be turned, but for economic production the flange is stamped out of sheet metal in two halves 52, 54 secured together by a bolt and nut 26 extending through openings 58, 60 in tube 16 and flanged members 52, 54.

FIGS. 9-11 show a platform 70 for the user to stand on before starting out on the wire, and to return to. The platform has a depending semi-cylindrical portion 72 secured to tube 16 by a pair of bolts 74 extending through openings 76 in the semi-cylindrical portion 72 and through tube 16. Incidentally, means for adjusting the height of tightwire 10 is readily provided by extra openings in standard 16, i.e., extra openings 58 shown in FIG. 8 to change the height of the tightwire by varying the point of attachment of ground bearing flanges 52, 54 or extra openings 17 for U-bolt 32 (FIGS. 3, 4 and 9) and extra openings 75 for bolts 74 of platform 70.

Platform 70 is partly supported by the bolts 74 secured to tube 16 and is partly supported by connection with U-bolts 78 extending through openings 79 in platform 70 and securing tightwire 10 to the platform by nuts (not shown). The platform is a stamping from light metal sheet and is given additional rigidity by depending edge flange 80 and
by configuring its flat surface with ribs 82. A foam pad 84 is provided on the flat surface of the platform (FIG. 10). An adhesive can be provided in the tightwire kit to bond pad 84 in place after assembly or the pad can be bonded to the platform 70 in original manufacture and be split to provide access for tightwire 10 and U-bolts 78. The purpose of the foam pad 84 is to avoid injury to the user if he should strike the platform in falling. In the structure of my prior patent application the platform was protected on either side by a standard, for a user to grab to avoid hitting the platform, but, with the present single pole standard 16, the platform 70 has to be cantilevered so that it is more exposed, making the padding more important. The platform 70 shown is of economical construction being a stamper. In fact, for economy of manufacturing process, it may become desirable to make the platform in two pieces bolted together, as will be understood by those skilled in the art of such manufacturing. One reason the platform is of economical manufacture is that it is partly supported by the standard and partly by the wire, so that it does not have to have the normal strength to entirely cantilever a platform supporting a user's weight.

The erection of the tightwire is simple and easy. The only part physically difficult or consuming much time is the screwing into the ground of earth anchors 12 (the effort and time depending partly on the character of the ground). A bar through eye 28 of anchor 12 is used to rotate the anchor. After ground anchors 12 are in place, standards 16 are merely erected more or less vertically and more or less on the line between anchors 12 (by "more or less" is meant that tolerances are generous). Standards 10 can be driven with a maul, or axe, or by a sleeve like that used to drive metal fence posts. Cable 10 is attached to standards 16 by U-bolts 32. This could be done before standards 16 are erected, i.e., as long as the points of attachment on cable 10 are spaced about the same distance as the separation of the portions of the standards in the ground will have, no later adjustment is needed. On the other hand, the final adjustment (and securing) of the cable 10 in the U-bolt 32 instead can be part of the assembly and tending of the end assemblies consisting of the looping of the ends of cable 10 through turnbuckle hooks or eyes 24 and the securing of the loops with cable clamps 20, 22, the connection of the other turnbuckle hook 26 through the eye of anchor 12, the tightening of turnbuckle 14, etc. Usually the turnbuckle will have to be tightened several times (on the day of erection and later), and possibly the cable loops will have to be adjusted once to shorten the assembly as the assembly becomes tensed, because anchors 12 bend somewhat in the ground, the cable takes force to thoroughly straighten, etc. The use of two turnbuckles has proven quite satisfactory, but it would be possible to substitute one turnbuckle or a different wire tightening means.

When assembled, the tightwire is ready for use. A balancing pole or umbrella can be considered as a purely optional accessory, as a tightwire can be walked without such aid. In fact, it is obviously a higher skill to walk a tightwire without an aid, and the cost of tightwire equipment is substantially reduced to the extent balancing aids are not, at least, considered necessary items of original purchase.

Having thus described my invention, I do not wish to be understood as limiting myself to the precise disclosure but instead wish to cover methods of working and modifications thereof which will occur to those skilled in the art upon learning of my invention, and which properly fall within the scope of my invention.

I claim:

1. Sports tightwire equipment in which a tensed cable string including cable means and wire tightening means is supported above the ground, comprising:

(a) a pair of standards supporting said cable string intermediate its ends a short distance above the ground;

(b) each standard being a single post-like body having a lower end penetrating and secured directly in the ground, said cable means being fixedly secured to said body, whereby during use working of the lower end of said body in said ground and tipping of the upper end thereof in the vertical plane which includes said cable means is restricted by the securing of the lower end of the body in the ground and by the securing of an intermediate portion of said body to said cable means, the upper end of each standard extending above said cable means to a height to be grasped by a standing user;

(c) a pair of anchors disposed in the ground with said standards therebetween;

(d) the ends of said cable string being secured to said anchors.

2. The subject matter of claim 1 in which said cable means is a single unitary cable which is unbroken at said standards and extends from one end portion of said cable string beyond one standard to the other end portion of said cable string beyond the other standard, whereby integrity of said cable string is not impaired by use of more than one cable.

3. The subject matter of claim 2 in which said single cable abuts a side of each standard at a point spaced from its corresponding end and is secured at that point.

4. The subject matter of claim 3 in which each standard is a tube and a U-bolt in each tube fixedly securing said single cable to a side of said tube.

5. The subject matter of claim 4 in which each standard has an abutment bearing on the ground and limiting penetration.

6. The subject matter of claim 5 in which each standard is a tube and in which said abutment is an annular flange secured on said tube.

7. The subject matter of claim 6 in which said annular flange is formed of two generally semi-circular segments with lapped ends, and a bolt securing said flange, and said tube and said lapped ends of said semi-circular flange segments having openings receiving said bolt.

8. The subject matter of claim 1 in which each standard has a platform secured to and partly supported by said standard, the platform on each standard extending toward the opposite standard in a cantilevered manner and being partly supported by said cable means.

9. The subject matter of claim 8 in which each standard is a tube and in which, said platform has a depending semi-cylindrical portion abutting and conforming to the shape of said tube and secured thereto.

10. The subject matter of claim 9 in which said platform has a depending flange substantially therearound for structural strength and in which said cable means is superposed centrally to the top of said platform and secured thereto by U-bolt means.

11. The subject matter of claim 8 in which said platform has a pad covering upper exposed areas thereof to protect a user falling down against the same.

12. The subject matter of claim 1 in which said cable means includes a cable and a coating on said cable with a higher coefficient of friction than metal wire rope thereby to compensate for any deficiencies in friction of footwear of users.

References Cited

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