PORTABLE COLLAPSIBLE CORRAL FENCE

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ABSTRACT

A portable and collapsible fence that can be conveniently stored and transported in a lightweight carrying case. The fence includes panels having telescopic rail sections and telescopic posts. The middle section of each fence panel includes a series of one-piece double tubes. The use of the double tubes adds structural stability to the fence panels and allows the fence panels to utilize many identical parts, such that the panels can be manufactured efficiently and economically. The fence is also preferably formed of lightweight polymer so that it is resilient and easily transported by hand in a relatively small carrying case provided therefor.
Fig. 9a

Fig. 9b

Fig. 9c
PORTABLE COLLAPSIBLE CORRAL FENCE

CROSS REFERENCE TO RELATED APPLICATION


BACKGROUND OF INVENTION

[0002] Animals, such as horses, are typically transported for endurance, rodeo and other events by trailers that are known in the art. Once the trailer arrives at the destination of the event, it is desirable to provide a secure and comfortable area for the horses. It is known in the art to provide fence panels that can be assembled together once the trailer arrives at the destination. Unfortunately, these known systems have many drawbacks.

[0003] For example, one known and commercially available portable corral consists of multiple panels that are available in 5 foot or 8 foot widths, 50 inch height, and are 18 to 25 pounds per panel. A mounting system is available to mount the panels exteriorly of the trailer during transport. Undesirably, the trailer becomes rather unsightly and aesthetically unappealing with the panels mounted thereon. Further, the disassembled fence occupies an undesirably large amount of space. As mentioned, the panels are 5 to 8 feet wide, and the six to eight panels required for an adequate size fence can occupy about a foot depth when stacked and attached to the trailer. In addition to the cost of the panels, a person using this type of trailer mounted system must also separately purchase a trailer mounting kit.

[0004] Another known portable horse corral consists of a reel attached to the outside of the trailer from which a plastic fence having about 2 inch square grids is unrolled. Self-driving posts are provided with this system to hold the plastic fence. While lighter than the portable panels just described, this plastic fence is still mounted to the outside of the trailer and therefore is undesirable from an aesthetic standpoint. Further, the fence, itself, is unsightly when assembled, appearing much like the standard fencing that is erected around construction sites.

[0005] It is known to provide various barriers that can be expanded or contracted. For example, U.S. Pat. No. 4,465,262 discloses a portable barrier which includes two panels that are slide horizontally relative to one another by means of sleeves and pins. Each of the panels includes two sections telescoped together and moveable vertically relative to each other to expand or contract the barrier. The sections are held in the desired telescoped position by means of screws. Applications of the disclosed barrier are directed to using it as a barrier between rooms, e.g., to provide a barrier for toddlers.

[0006] U.S. Pat. No. 5,842,685 discloses a temporary guard rail system that includes a plurality of upright stanchions having mounting brackets integrally formed or attached thereto that are connected by a plurality of vertically spaced, generally horizontal side rails extending end to end. The tubular guard rails are fabricated in a plurality of sections that may be slidably engaged, one inside another, to provide a telescoping adjustment of length.

[0007] It is desirable to improve upon the prior art noted above to provide a lightweight portable fence and to avoid mounting the fence panels to the outside of the trailer in order to transport them.

BRIEF INVENTION SUMMARY

[0008] The present invention is a portable and collapsible fence that can be conveniently stored and transported in a lightweight carrying case. The fence includes panels having telescopic rail sections and telescopic posts. The fence panels utilize many identical parts such that the panels can be manufactured economically.

[0009] In one form thereof, the present invention provides a portable and collapsible fence panel. The panel comprises a plurality of rail sections connected to one another, the rail sections being expandable and contractible with respect to one another in a substantially horizontal direction. A first of the rail sections comprises a plurality of spaced rails disposed substantially parallel to one another. A second of the rail sections comprises a plurality of rail pairs disposed substantially parallel to one another.

[0010] Preferably, the separate rails of the pairs are fixed relative to one another and occupy a common vertical plane. The rail section that includes the rail pairs is typically provided in the middle of a fence panel, thereby increasing the strength of the panel. The rails sections on either side expand away from the middle section and include identical clamping members on either side of the panels are positioned vertically at different elevations (i.e., vertically offset) such that the clamping members mate with one another when connecting two fence panels.

[0011] More preferably, the fence panel includes end posts that are expandable in a vertical direction, such that the panels are expandable and collapsible in vertical and horizontal directions. More preferably, expanding and collapsing the fence panel is accomplished structurally by utilizing telescopic segments or rails.

[0012] Preferably, the fence panels are constructed of polymeric material, more preferably uv-stabilized polymer material. A variety of shapes may be utilized for the individual posts or rails of the fence, such as rectangular, square, cylindrical, polygonal, etc.

[0013] One advantage of the present invention is that it provides a lightweight fence that is easy to carry in a single carrying case. Indeed, in one embodiment, the carrying case with eight (8) panels therein is about 34 inches wide by about 30 inches tall by about sixteen (16) inches deep and weighs about 45-55 pounds.

[0014] Another advantage of the present invention is that it eliminates the unsightly panels mounted to the side of the trailer as in prior art fences for horses. Furthermore, when prior art panels are mounted to the side of a trailer, they limit the space for horses to be tied to the trailer.

[0015] Another advantage of avoiding the trailer mounting system just noted is that a person owning horses may travel with a friend, i.e., without his or her trailer and trailer-mounted fence panels. Instead, an owner of a fence in accordance with the present invention can simply transport his or her fence in the trunk or backseat of a car, for example.
Yet another advantage of the present invention is that it is made from polypropylene or other suitable plastic material that has sufficient resilience. Other plastics suitable for the present invention include, without limitation, poly-carbonate, polyethylene, polypropylene, polyurethane, poly vinyl chloride (PVC), PB, etc. The plastic material may be treated or stabilized to resist or eliminate the effects of ultraviolet radiation. Thus, unlike prior art metal (aluminum) panels that can be bent when a horse presses against or bumps into them, the panels of the present invention are resilient. Further, unlike the prior art metal panels, fence panels in accordance with the present invention are less likely to corrode.

Still another advantage of the present invention is the versatility it provides. With one set of eight panels, numerous geometric fence configurations are possible. Numerous applications are also possible, including crowd control, barriers, construction sites, etc. For example, large discount department stores may use such portable fences as provided by the present invention to create a barrier for nonpermanent or seasonal areas, such as law and garden centers. Similarly, food vendors at the county fair may also utilize portable fences in accordance with the present invention. Numerous other applications are within the scope of the present invention.

Yet another advantage of the present invention is that it is “self-standing.” In most configurations other than straight line the fence does not need feet to support itself. In straight line applications, however, feet members or stakes can be provided to erect the fence, and such feet may be used when additional vertical stability is desired.

BRIEF DESCRIPTION OF THE DRAWINGS

The above-mentioned and other advantages of the present invention, and the manner of obtaining them, will become more apparent and the invention itself will be better understood by reference to the following description of the embodiments of the invention taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a portable fence in accordance with the present invention, illustrating the fence being used in combination with a horse trailer and also illustrating fences within the fence;

FIG. 2 is an elevational view of a fence panel of the fence illustrated in FIG. 1;

FIG. 2a is a fragmentary view in partial cross-section illustrating the telescopic engagement of the fence rails of the panel shown in FIG. 2;

FIG. 3 is a fragmentary perspective view illustrating the pivotable attachment mechanism of two panels like that illustrated in FIG. 2;

FIG. 4 is a fragmentary elevational view illustrating that the rail sections are formed from substantially identical halves as shown in FIGS. 8a and 8b;

FIGS. 5a-5e are perspective views illustrating the pivotable capability of fence panels relative to one another in accordance with the present invention;

FIGS. 6a-6c are top views of possible geometric configurations using fence panels in accordance with the present invention;

FIG. 7 is a perspective view partially in phantom, illustrating the expanding and contracting feature of a fence panel in accordance with the present invention;

FIGS. 8a and 8b are a fragmentary perspective view and an end view, respectively, illustrating the attachment of two rail section halves to form a rail section in accordance with the present invention;

FIGS. 9a-9c illustrate a pet carrier which is another embodiment utilizing the principles of the present invention;

FIGS. 10a and 10b illustrate another embodiment of a fence panel in accordance with the present invention;

FIG. 11 is a perspective view illustrating a carrying case for a series of fence panels in accordance with the present invention;

FIG. 12 is a perspective view of another embodiment of a fence panel in accordance with the present invention;

FIG. 13 is a perspective view, partially in phantom, showing the expandable and contractible ability of the panel shown in FIG. 12;

FIG. 14 is a perspective view of the panel shown in FIG. 12 in the fully contracted position;

FIG. 15 is an elevational view of the panel shown in FIG. 14;

FIG. 16 is an elevational view of the embodiment shown in FIG. 12 in the fully expanded position;

FIG. 17 is a perspective view of one embodiment of a rail section or end post;

FIG. 18 is a fragmentary perspective view of a clamping member;

FIG. 19 is a fragmentary perspective view of a connecting member;

FIG. 20 is an enlarged perspective view of a clamping member;

FIG. 21 is a fragmentary perspective view showing how two panels may be releasably and pivotally connected;

FIG. 22 is a perspective view of a foot;

FIG. 22a is a perspective view of a base peg;

FIG. 23 is a perspective view showing how one panel of the embodiment shown in FIG. 12 may be releasably and pivotally connected to a trailer;

FIG. 24 is a perspective view of another embodiment of a fence panel in the fully contracted position;

FIG. 25 is a perspective view of a support post utilized in the panel of FIG. 24;

FIG. 26 is a side view of a clamp connector utilized in the panel of FIG. 24;

FIG. 27 is a perspective view of the panel shown in FIG. 24 in the fully expanded position;

FIG. 28 is a perspective view of a Christmas tree connector used in the panel of FIG. 24;
FIG. 29 is a perspective view of a rail used in the panel of FIG. 27;

FIG. 30 is a side view of a spring retention device (also shown in FIG. 32) utilized in the panel of FIG. 24 (not shown);

FIG. 31 is a perspective view of two panels of FIG. 24 releasably connected to one another;

FIG. 32 is a close up view of section A-A of FIG. 31;

FIG. 33 is a perspective view of a pin utilized in to connect the panels of FIGS. 31 and 32.

Corresponding reference characters indicate corresponding parts throughout the several views.

DETAILED DESCRIPTION OF THE INVENTION

The embodiments of the present invention described below are not intended to be exhaustive or to limit the invention to the precise forms disclosed in the following detailed description. Rather, the embodiments are chosen and described so that others skilled in the art may appreciate and understand the principles and practices of the present invention.

Referring now to FIG. 1, fence 20 includes panels 22 that are removably and pivotally connected to one another. One side of fence 20 is formed by trailer 24 so that an enclosed fence is provided for horses 26. As shown with reference to FIG. 2, each panel 22 includes three rail sections 28, 30, and 32. Each rail section includes three spaced and substantially parallel rails 34, 34a and 34b respectively. The difference in rails 34, 34a and 34b is that they are sized differently so as to telescopically fit into one another, rail's 34 diameter being larger than rail's 34a diameter and rail's 34a diameter being larger than rail's 34b diameter. Turning briefly to FIG. 7, it can be appreciated that the rail sections are expandable and contractible as a unit in a substantially horizontal direction. Further, extensions 38 are also telescopically expandable as noted below. In its fully collapsed state, the fence panel 22 of the illustrated embodiment is approximately 34 inches wide by 30 inches tall. In its fully expanded configuration, fence panel 22 of the illustrated embodiment is approximately 77 inches wide by 51 inches tall. Thus, it can be appreciated that the collapsed panel takes up approximately 26% of the space of the fully expanded panel.

Continuing in reference to FIG. 2, it can be appreciated that panel 22 includes left end post 36 and right end post 37 that are expandable and contractible in a direction substantially orthogonal to rails 34, 34a and 34b. This is accomplished by means of end post telescopic extensions 38 that telescope in and out of posts 36 and 37 as shown in FIG. 7. A locking mechanism 40 (FIG. 2) is provided on each end post 36 and 37 such that post extension 38 can be locked in place in their outwardly extended position. The locking mechanism can be any one of a variety of mechanisms known in the art, and in the (one) illustrated embodiment it comprises a depressable button that protrudes from post extension 38 and mates within a complementary sized opening in left end post 36 and right end post 37. Optionally, a foot 39 can be removably attached to post extension 38, as shown in phantom, to provide extra stability to the assembled fence and allow the fence to be free-standing without sinking segments 38 into the ground. The foot 39 may be weighted to provide increased stability of the fence and to allow the panels 22 to be arranged in a straight line. Panel 22 also includes mid-posts 35 which provide structural stability to the rail sections and in turn to the fence panel.

As illustrated in FIGS. 4, 8a and 8b, each rail section is formed from two substantially identical rail section halves. The half sections can be formed from polypropylene or other suitable polymer by an injection molding process. A portion of half 42 into which half 44 fits is illustrated in FIG. 4. Returning now to FIG. 2, it is important that top and bottom connectors or connecting members 46 on the left post 36 are both spaced the same distance ‘d’ from the top and bottom of the panel as shown. In this manner, two identical halves 42, which represents substantial manufacturing savings. For the reasons just noted, it is also important that top and bottom connectors 48 on right post 37 are spaced the same distance ‘d’ from the top and bottom of the panel as shown. In this manner, two identical halves can be formed and connected together to form rail section 28, whereupon connector halves 43 (FIG. 4) will align and mate with one another. Thus, only one mold is needed to make both halves 42, which represents substantial manufacturing savings. For the reasons just noted, it is also important that top and bottom connectors 48 on right post 37 are spaced the same distance ‘d’ from the top and bottom of the panel as shown. In this manner, two identical halves can be formed and connected together to form rail section 32.

With further reference to FIG. 2, another important feature that maintains the rail section halves of rail sections 28 and 32 substantially identical and thus able to be formed from a single mold is that rail sections 28 and 32 have substantially identical fitting members 50 and 52 that extend in substantially opposite directions. The top fitting members are adapted for an accessory such as a cap 54 (shown in FIG. 3) and the bottom fitting members receive end post telescopic extensions 38. Rail section 30 has no fitting members, since it is the central rail section of panel 22. The round opening (locking mechanism) 40 can be molded as a “prepunch” such that the bottom fitting members 52 will be punched through after the parts are molded. With reference to FIGS. 8a and 8b, the molds that form the halves can be adjusted such that top half (cap) 54, shown in FIGS. 8a and 8b, is formed with pointed connection member 56 and notch 58. Bottom half 60 is formed with complementary square hook 62 that is received into notch 58 in a snap-fit engagement.

Even though the attachment mechanisms are not identical (compare FIGS. 8a and 8b), only one mold is needed for both halves of each rail section. This is because the mold parts that form the top and bottom connection members can be interchanged on the mold. Thus, only one mold is required that has interchangeable parts to form one of the connection mechanisms illustrated in either FIG. 8a or 8b.

Once the halves are locked together, they do not come apart. As illustrated in FIG. 4, halves 44 of section 30 must be snapped together and installed into one half 42 of section 28 before the other half 42 of section 28 can be snapped over the first half 42. This assembly process is similar with regard to all rail sections. That is, the halves of rail section 32 must be snapped together and placed into one of the halves 44 (shown in FIG. 4) of section 30 before the other half 44 can be snapped to the first half 44.
With reference to FIG. 2a, it can be appreciated that rails 34a telescopically slide into the cylindrical recesses formed by corresponding rails 34. Importantly, cylinders 64 are formed with a smaller bearing surface 66 which holds rails 34a in place and keeps them from wobbling within cylinders 64. With further reference to FIG. 2a, a stop member 68 is disposed at the end of rail 34a and mates with bearing surface 66 to prevent rail 34a from being removed from cylinder 64 of rail 34 once the halves of section 28 are snapped together.

Turning now to FIG. 3, the connection mechanism that pivotably and removably connects fence panels 22 can be appreciated. Right end post 37 includes connector 48 extending therefrom that mates with connector 46 of left end post 36. A pin 70 has a handle 72 and a cylindrical body 74 having locking tabs 76 extending outwardly from the bottom thereof. A recess 78 having a shape that corresponds to the shape of the cylindrical body 74 with locking tabs 75 is formed in both connectors 46 and 48. As shown in phantom in FIG. 3, once pin 74 is inserted all of the way through recess 78 in both connectors 46 and 48, handle 72 is turned and the locking tabs 76 whereby prevents pin 70 from being removed from connectors 46 and 48 and the pin holds the connectors together. Consequently, two panels 22 are joined together by their respective connectors 46 and 48.

It is to be understood that a connector such as connector 46 or 48 can be mounted to trailer 22 (shown in FIG. 1) so that the panels can be removably attached thereto in much the same fashion as the connection depicted in FIG. 3. In such case, one of the connectors would be mounted to the trailer instead of post 36 or 37. A small flange member (not shown) would be formed or attached to the connectors to mount them to the trailer. Of course, such connectors will occupy a minimum amount of space on the trailer, quite unlike mounting a multitude of panels to the outside of a trailer as is taught by the prior art.

The advantages of the pivotable and removable connection just described can be appreciated with reference to FIGS. 5a-5c. In FIG. 5a, panel 80 is pivoted about panel 82 such that there is an angle of about 55 degrees therebetween, which represents about the minimum angle of pivot between these two panels. In FIG. 5b, panel 80 has been rotated such that there is an angle of about 180 degrees between it and panel 82. Finally, panel 80 is further rotated, as shown in FIG. 5c, such that there is again an angle of about 75 degrees between it and the other side of panel 82 as shown. It can be appreciated with reference to FIG. 3 that the 55 degree limit shown in FIG. 5a occurs as a result of end posts 36 and 37 abutting against one another. Connectors 46 and 48 could be formed so that they extend further from end posts 36 and 37, respectively, in order to allow the panels to be pivoted closer to one another, if so desired.

With reference to FIGS. 6a-6c, it can be appreciated that eight panels 86, 88, 90, 92, 94, 96, 98 and 100 can be configured into an open rectangle (shown in FIG. 6a), a closed octagon (shown in FIG. 6f) and a closed square (shown in FIG. 6c). It should be readily recognized that numerous other configurations (open or closed) are possible depending upon the number of panels chosen and the geometric shape desired.

Turning now to FIGS. 9a-9c, another embodiment of the present invention is illustrated for use in transporting a pet, such as a dog or cat. Transportable kennel 102 is expandable and collapsible as illustrated by contrasting FIGS. 9a and 9b. Kennel 102 includes rail sections 104, 106 and 108 that include rectangular telescopic rails 110, 112 and 114, respectively, each being successively smaller in diameter so as to telescopically engage one another. Kennel 102 also includes a telescopic bottom portion 116 having telescopic rectangular sections 118, 120 and 122 as shown. Kennel 102 also includes a front door 124 and carrying handle 126, as are known in the art.

With reference to FIGS. 10a and 10b, another fence panel embodiment is illustrated which includes telescopic rail sections that span virtually the entire height of panel 136 (22). Comparing panel 136 to panel 22 of FIG. 2, panel 136 has four sections 128, 130, 132 and 134 instead of three and has a plurality of telescopic rails in each section instead of just three.

Turning now to FIG. 11 a carrying case 136 is provided to hold and transport several panels 22. Carrying case 137 includes handles 138, shoulder strap 140 and an opening 142, preferably zipped. In the illustrated embodiment, case 136 holds eight (8) panels 22. Advantageously, the total weight of case 136 having eight panels 22 therein is only about 45-55 pounds. Thus, it can be appreciated that the present invention provides a convenient, lightweight, easily transportable fence that offers a significant improvement over the prior art. It can now be understood that the present invention provides a convenient method for assembling a portable corral for horses. First, panels 22 are removed from carrying case or bag 136. Next, the panels are vertically and horizontally expanded. A geometric shape and configuration is selected for the assembled fence. Then, the panels are connected together and pivoted about one another to form the desired geometric configuration.

It is also to be understood that the present invention has applications beyond containing horses. For example, it is contemplated that a series of perhaps sixty (60) panels, providing 360 linear feet of fence, can be housed in a container whose dimensions are approximately 34 inches in width by 30 inches in height by 10 feet in length. A single container of these dimensions could be transported on a pick-up truck, whereas several of such containers could be transported on a conventional trailer.

FIG. 12 shows another embodiment of a collapsible and expandable fence panel. Referring to FIG. 12, panel 200 comprises a plurality of rail sections 201, 201a and 201b. Section 201 serves as the middle section of panel 200 and is slidably engaged with, at opposite ends, respectively, sections 201a and 201b. Section 201a comprises a plurality of paired rails 204 and 204a, each pair having one rail 204 stacked on top of another rail 204a and positioned in a common vertical plane with rail 204a. Rails 204 and 204a do not move relative to one another. Section 201 serves as one end of panel 200 and comprises a plurality of first rails 202 affixed to first end post 208. A first bottom extension post 212 is slidably engaged with first end post 208 and extends downward therefrom in a telescopic arrangement as described above. Section 201b serves as the other end of panel 200 opposite of, and substantially parallel to section 201. Section 201b comprises a plurality of rails 206 affixed to end post 210. A second bottom extension post 214 is slidably engaged with end post 210 and extends downward therefrom in a telescopic arrangement as described above.
Section 201a slideably engages section 201, and at its opposite end slideably engages section 201b. Specifically, rail 204a allows for movement of section 201b with respect thereto in a substantially horizontal direction, whereas rail 204 allows for horizontal movement of section 201 in an opposite direction with respect to section 201a. Sections 201, 201a and 201b are positioned in substantially the same vertical plane, thereby forming panel 200. However, rails 202 are vertically offset from rails 206, meaning that rails 202 are positioned at a different (in this case higher) vertical elevation relative to rails 206. Thus, rails 202 slide into middle section’s 201a rails 204 and rails 206 slide into the middle section’s rails 204a when panel 200 is collapsed.

With reference to FIG. 15, end posts 208 and 210 include a plurality of clamping bodies or clamping members 220, 220a and 222, which support rails 202 of section 201 and rails 206 of section 201b. Clamping bodies or members 224 support the middle rails 202, 206 of sections 201 and 201b, respectively. Turning now to FIG. 12, section 201 on the left hand side thereof moves horizontally with respect to section 201a and section 201b moves horizontally in the opposite direction with respect to section 201a. In the embodiment illustrated, it is apparent that the inside diameter of second rails 204 and 204a is larger than the outside diameter of both the first rails 202 of section 201 and the third rails 206 of section 201b. Preferably, rails 202 and 206 are identically sized so as to reduce the number of different parts required for manufacturing inventive panel 200.

Rails 202 are moved in a generally horizontal direction so that they slide into or out of second rails 204, thereby collapsing or expanding panel 200. Rails 206 move with respect to rails 204a in substantially the same manner as just described, but in an opposite direction, thereby collapsing or expanding panel 200. Furthermore, extension posts 212 and 214 are also expandable and collapsible with respect to end posts 208 and 210 respectively, in a vertical direction, whereby panel 200 is also expandable and collapsible in a vertical direction.

The vertical disposition of rails 204 and 204a reduces the width of panel 200, thereby allowing compact storage of two panels 200. The vertical disposition of rails 204 and 204a also provides increased rigidity and strength to panel 200. For example, middle rail section 201a is spaced a rail section away from end post 208 and 210 and, thus, does not obtain as much structural support from end posts 208 and 210 as do sections 201 and 201b respectively. Thus, providing rail pairs 204, 204a (as opposed to single rails) at the center of fence panel 200 compensates for the spacing of section 201a from the end posts and thus enhances the strength and rigidity of section 201a and the entire fence panel 200. As noted, sections 201 and 201b slide into opposite ends of section 201a, thereby collapsing the panel 200 for storage or transport. A collapsed panel 200 is shown in FIG. 14.

Returning now to FIG. 15, in one embodiment, the upper and lower rail pairs 204, 204a are secured together using clamping body 224, whereas the middle rail pair 204, 204a is secured by clamping bodies 226. Clamping bodies 224 and 226 maintain substantially vertical disposition of second rails 204 and 204a. Clamping bodies 224 are connected and secured to clamping bodies 226 by vertical tubular members 230 which have a length chosen to space the multiple rail pairs 204, 204a a desired distance from one another. Tubular members or vertical post 230 are provided in separate sections such that rails 202 can slide within rails 204 and rails 206 can slide within rails 204a because tubular members 230 do not extend through clamping bodies 226. Furthermore, the tubular members 230 prevent sagging of the horizontal rails 202, 204 and 206. In this figure, the disclosed embodiment illustrates three rail pairs spaced from one another. However, it should be readily recognized by one of ordinary skill in the art that the present invention contemplates different numbers of rail pairs 204, 204a which can be spaced apart any desired distance from one another. In some applications, only one rail pair 204, 204a may be required, whereas in other applications, four or more rail pairs may be needed. The design is thus versatile and encompasses different numbers of rail pairs depending on the desired application. For preferred applications involving rodeo horses, the desired number of rail pairs 204, 204a is three.

It is apparent that by arranging the first rail sections 201 and third rail sections 201b as shown in FIG. 12, when two panels 200 are aligned end-to-end, the first connecting member 216 of one panel 200 becomes aligned along the same vertical axis as connecting member 218 of the other panel 200, thereby facilitating releasable and pivotable connection of several panels with pin 264 shown in FIG. 21. Advantageously, connecting members 218 and 216 are identical and indeed are formed as part of identical clamping members 220 and 222. They align conveniently on top of one another because of their respective vertical locations where they are affixed to posts 208 and 210.

Referring now to FIG. 16, rails 204 and 204a of section 201a allow into and extension of first rail section 201a and third rail section 201b. To lock rail sections 201 and 201b in their extended position with respect to section 201a, a locking mechanism is provided. For example, rails 202 may be configured with the depressible protrusions (not shown) which extend into mating openings 238 in rails 204 and 204a. In other words, the interior surface of rail 204 holds the protrusion against the outside surface of rail 202 until the protrusion aligns with opening 238, whereupon the protrusion expands and pops into opening 238, thereby holding section 201 in its extended configuration. To collapse the fence, a thumb or finger pushes against the protrusion extending from opening 238 while simultaneously pushing the sections together. This type of locking mechanism is well known in the art and others readily substitutable would be recognizable by persons of ordinary skill. In the illustrated embodiment, only two locking mechanisms are provided for each section 201a and 201b. Otherwise, the person assembling the fence may have difficulties, in that he or she only has two hands.

Referring to FIG. 17, a perspective view of the general design of either the first rails 202, second rails 204 and 204a, third rails 206, end posts 208 and 210, and vertical members 230 is shown. The illustrated embodiment uses material that is formed in a cylindrical shape. However, it should be recognized that other shapes, such as squares, triangular or polygonal, will also perform suitably. In fact, it is anticipated that non-cylindrical shapes may be preferable in certain applications because they may provide increased stability to the fence panel, as opposed to cylindrical telescopic segments which may rotate relative to one another.
[0081] Referring now to FIG. 18, clamping members 224 are manufactured in halves 229 using the same mold. Clamping members 224 include fasteners, in this case, cylindrical protrusions 246 and 248 which secure rails 204 and 204a thereto. Protrusions 250 secure tubular members 230 to rail sections 204 and 204a of section 201a. Protrusions 246, 248 and 250 fit into openings 249 formed in the rails and vertical members as illustrated in FIG. 17.

[0082] Turning now to FIG. 19, the assembly of clamping body 220 which forms a top right portion of panel 200 can be appreciated. Clamping body 220 includes identical half sections 221 and 223, as shown. Each half section includes cylindrical protrusions 253 and 255, as shown. During assembly, tube or rail 206 is placed against half 221 and protrusion 253 aligned with opening 257 formed in rail 206. Two openings 257 are formed in rail 206, only one of which is shown in FIG. 19. Similarly, post 210 is placed against half 221 and opening 261 aligned with protrusion 255 such that protrusion 255 mates with opening 261. Post 210 is configured with two openings 261 on opposite sides thereof, but only one opening 261 is shown in FIG. 19. Next, half section 223 is placed over rails 206 and 206 such that the protrusions align with the openings and fit therein. Then, halves 221 and 223 are secured together by heat welding, glue, sonic welding or other suitable bonding mechanism known in the art. It is also in vision that clamps with a tapered sleeves or collars could also be used to secure halves 221 and 223 together. For example, the tapered sleeve could be positioned over the halves so that the further the tapered sleeve is slid, the tighter the connection between halves 221 and 223 becomes.

[0083] Referring to FIG. 20, a half 225 of clamping body 226 is depicted. Clamping body 226 secures vertical members 230 and the middle pair of rails 204 and 204a. Clamping members 226 are manufactured in identical halves 225 shown in FIG. 20. In the same manner as protrusions 253 and 255 of clamping body 220 fit into complimentary openings 257 of rail 236 and opening 261 of post 210, protrusions 260a of clamping body 226 fit into and mate with complimentary openings in rail sections 204 and 204a and protrusions 262a fit into and mate with complimentary openings in vertical members 230.

[0084] FIG. 21 shows how two panels 200 may be releasably and pivotably connected using first connecting member 216, second connecting member 218 and pin 264. First clamping member 220 and second clamping member 220' are arranged on posts 208 and 210, respectively, so that the first connecting member 216 and the second connecting member 218 align end-to-end along the same vertical axis to form pin receptacle 270. Advantageously, connecting members 220 and 220' are identical, differing only in where they are affixed to end posts 208 and 210. As noted above, this also means that connecting members 216 and 218 are identical.

[0085] Pin 264 has a head end 266 having a circumference larger than the body of the pin. Pin 264 has a bottom end 268 having flared and outwardly biased members 267 suitable for securing pin 264 in pin receptacle 270. This connection mechanism allows panels 200 to be rotated to change the angle of one panel with respect to another, as described above. To release the pin, nuts 269 are pressed together and the head 266 of pin 264 can be pulled upwardly, releasing it from receptacle 270.

[0086] FIG. 22 shows one embodiment of foot 272 having base 274 which includes support members 278 which circumscribe female tubular member 276 which, in turn is adapted to receive a bottom post 212 or 214. Feet 272 can advantageously be used when a plurality of fence panels 200 are aligned end-to-end in a straight-line relationship, which would not be self-supporting without feet 272. FIG. 22a shows another embodiment of a foot 280 with a stake member 282. FOOT 280 has at its upper end a tubular receptor 276 again for slidable receipt of extension post 212 or 214. The stake member 282 as shown can be inserted into soil to secure panel 200 to the ground.

[0087] FIG. 23 shows a panel 200 secured to a trailer 24. A trailer bracket 284 is securely mounted to trailer 24 and includes a plurality of connector members 286 similar to connector members 216 and 218, described above. Members 286 are arranged to align with members 216 and 218 such that pins 264 can be inserted therein, thereby securing panel 200 to trailer 24.

[0088] The above-described embodiments of the fence panels explain that the fence panels can be connected to one another pivotally and releasably. However, in some situations, it may be desirable to prevent the fence panels from pivoting about the pins that connect them to one another. Moreover, it is also desirable to decrease the number of parts necessary to manufacture the previously described fence panels by utilizing one-piece connectors instead of multi-piece clamping bodies.

[0089] FIG. 24 shows a perspective view of another embodiment of a collapsible and expandable fence panel 300. As shown in FIG. 24, fence panel 300 is in its collapsed position and comprises double tubes 304. Each double tube 304 comprises an upper tube 305 and a lower tube 306 that are intrical with one another. Each double tube 304 is a single piece of polypropylene or other suitable polymer and is manufactured by an extrusion process. This single piece structure increases the structural strength and stability of fence panel 300 and reduces the number of parts needed to assemble panel 300. In this embodiment, there are three double tubes 304 and each double tube is connected to another double tube by support posts 314.

[0090] FIG. 25 shows a perspective view of support post 314. As shown in FIG. 25, support post 314 has two ends 342 that surround a hollow opening 340 that runs the length of the post. Each support post 314 has a total of four locking tab receiving holes 330, two on opposite sides of posts 314 (only two are shown in FIG. 26). Referring back to FIG. 24, each end of support post 314 is connected to a clamp connector 315 that connect the support post to two of the double tubes 304. FIG. 26 shows a side view of clamp connector 315. As shown in FIG. 26, clamp connector 315 has a clamp portion 338, a cover plate 349 and an insert 316. Insert 316 has a plurality of ribs 346 and two locking tabs 317. Ribs 346 and locking tabs 317 are arranged and dimensioned so that insert 316 can be inserted into hollow opening 340 to engage the interior side of support post 314 when the insert is placed into opening 340 of support post 314. When insert 316 is fully inserted into opening 340 of support post 314, clamp portion 315 and cover plate 349 are placed adjacent to and cover one of the support post’s end 342. In this position, locking tabs 317 will interact with locking tab receiving holes 330 (shown in FIG. 25) so that
the clamp connector 315 will be locked in place in support post 314. The process will be repeated at the other end of the support post 314, so that the support post will have two clamp connecters 315 inserted into both of its ends 342 and locked into place by locking tabs 317.

[0091] FIG. 27 shows panel 300 in its fully expanded position. As shown in FIG. 27, when panel 300 is fully expanded, it has a mid section 302 with double rails 304, a left end section 310 and a right end section 309. While left end section 310 and right end section 309 are shown as a left end section and a right end section in FIG. 27, either of these sections could be on the left end or right end depending on how panel 300 is assembled or how one views panel 300. Right end section 309 and left end section 310 each comprise a set of three rails. Section 309 has three right end rails 311 that each have a diameter that is less than the diameter of lower tube 306. Rails 311 telescopically fit into lower tubes 306, so that each of the rails 311 slide in and out one of the lower tubes 306 in order to collapse and expand section 309. Similarly, section 310 has three left end rails 312 that each have a diameter that is less than the diameter of upper tube 305. Rails 312 telescopically fit into upper tubes 305, so that each of the rails slide in and out of tubes 305 in order to collapse and expand section 310. While left end rails 312 and right end rails 311 are in the same vertical plane, the left end rails are vertically offset from right end rails and are positioned at a different vertical elevation (in this case higher) relative to the right end rails. Left end rails 312 and right end rails 311 are the same size in diameter and in length.

[0092] Still referring to FIG. 27, panel 300 also has a left end post 307 and a right end post 308. While left end post 307 and right end post 308 are shown as left end post and right end post in FIG. 27, either of these posts could be on the left side or right side depending on how one views panel 300 or how panel 300 is assembled. Two extensions 313 telescopically engage left end post 307 and right end post 308. Each extension 313 has a diameter that is less than the diameter of end posts 307 and 308, so that extensions 313 can slide into and out of either end posts 307 or 308. In this manner, panel 300 can be vertically expanded.

[0093] A plurality of christmas tree connectors 318 connect each of rails 312 to end post 307 and rails 311 to end post 308. FIG. 28 shows a perspective view of christmas tree connector 318. As shown in FIG. 28, connector 318 has an insert 319 that is similar to clamp connector's 315 insert 316. Insert 319 also has plurality of ribs 346, cover plate 349 and two locking tabs 317 on opposite sides of insert 319 (only one locking tab is show in FIG. 28). Christmas tree connector 318 also has a hollow post receptacle opening 320 that extends the length of body 344. A pin receptacle 348 is intrically formed with christmas tree connector's body 344. Pin receptacle 348 has an opening 322 with a plurality of grooves 323 that run the length of the receptacle.

[0094] FIG. 29 shows a perspective view of an exemplary embodiment of a rail 311/312 that can be utilized as both the left end and right end rails. As shown in FIG. 29, rail 311/312 has two ends 342 that surround a hollowing opening 340 that extends through the length of the interior of the rail. Further, rail 311/312 has two locking tab receiving holes 330 and two button receiving holes 344, one on each side of rail 311/312 (only one of each hole is shown in FIG. 29). When insert 319 is fully inserted into opening 340 of rail 311/312, cover plate 349 is placed adjacent to and covers end 342. In this position, locking tabs 317 interact with locking tab receiving holes 330 so that connector 318 will be locked in place in rail 311/312. (shown in FIG. 27).

[0095] Referring to FIGS. 24 and 27, three christmas tree connectors 318 are connected to each end post 307 and 308. Post receptacle 320 of christmas tree connector 318 has a diameter that is larger than the diameter of each of the end posts 307 and 308. Each of the christmas tree connectors 318 is connected to each of the end posts 307 and 308 by sliding each of the connectors' post receptacles 320 around one of the posts. christmas tree connectors 318 are positioned on each end post 307 and 308 so that each of the connectors' 319 engage one of the rails 311 or 312. Thus, like rails 311 and 312, the christmas tree connectors 318 are placed in the proper position, each of the christmas tree connectors can be spot welded so that the christmas tree connectors do not slide out of position. Once each connector 318 is connected to its respective end post 307 or 308 and inserted into its respective rails 311 or 312, each of the rails will be connected to one of the end posts to form left end section 310 and right end section 309.

[0096] Referring to FIGS. 27 and 29, each rail 312 and 311 and each upper tube 305 and lower tube 306 have one button receiving hole 334. These button receiving holes 334 interact with a spring retention device that locks rails 311 and 312 in their fully expanded position. FIG. 30 shows a side view of a spring retention device 332. As shown in FIG. 30, spring retention device 332 is a single piece of spring metal that is bent about its center 350 so that its ends 352 can be pinched closer together. As ends 352 are pinched closer together, spring tension will build about center 350 so that once the pinching force is removed ends 352 will expand back out to their original position. Each end 352 has a protrusion that forms a button 336.

[0097] Referring to FIGS. 29 and 30, spring retention device's center 350 is inserted into the rail's end 342 with button receiving holes 334. As center 350 is inserted into opening 340, ends 352 of the spring retention device 332 are pinched together so that buttons 336 can fit inside opening 340. Buttons 336 are pinched closer together until they reach button receiving holes 334. At that point, the spring retention device 332 will spring back out so that buttons 336 fit into and through button receiving holes 334 of rails 311 and 312. After spring retention device 332 is inserted into each of the rails 311 and 312, the rail can then be inserted into double tubes 304. This is accomplished by sliding end 342 with spring retention device 332 into either upper tube 305 or lower tube 306 while depressing buttons 336. Buttons 336 will contact the interior of either upper tube 305 or lower tube 306 and be prevented from expanding back out. Once button 336 and spring retention device 332 reaches the button receiving hole 334 of either upper tube 305 or lower tube 306, spring retention device 332 will expand back out so that the buttons pass through the receiving holes 334 of the rail and the tube. In this position, rails 311 and 312 will be locked in their fully expanded position.
[0098] To collapse panel 300, a person can depress buttons 336 so that ends 352 pinch closer to one another. The interior surface of tubes 305 and 306 prevents spring retention device 332 from expanding back out and rails 311 and 312 slide respectively into tubes 305 and 306 until panel 300 is in its fully collapsed position (shown in FIG. 24). While this embodiment of panel 300 shows each upper tube 305 and lower tube 306 with a button receiving hole 334, it is advantageous to only have two double tubes 304 with button receiving holes 334 on its upper tube 305 and lower tube 306. In such an embodiment, one person can use his or her hands to push each of the buttons 336 in order to collapse each section of panel 300. If more than two double tubes 304 have button receiving holes 334, then more than one person will be needed to collapse each section.

[0099] Referring to FIG. 27, end posts 307 and 308 also have button receiving holes 334. Although not specifically shown, extensions 313 also have button holes 334 and spring retention devices 332. As already described in relation to rails 311 and 312, spring retention device 332 will lock extensions 313 in its fully extended position.

[0100] Each of these panels 300 can be connected to one another. FIG. 31 shows two panels 300 connected to one another by a plurality of pins 324. FIG. 32 shows a close up view of section A-A of FIG. 31. As shown in FIG. 32, the christmas tree connectors 318 on end post 307 are placed in a higher position than the christmas tree connectors on end post 308. Thus, when panels 300 are connected to one another, the christmas tree connectors of end post 308 and christmas tree connectors of end post 307 will be arranged so that the vertical axis of each connector’s pin receptacle 348 will be aligned with each other, so that pin 324 can be inserted through each of the pin receptacle openings 322.

[0101] FIG. 33 shows a perspective view of pin 324. As shown in FIG. 33, pin 324 has a flat circular pin head 327 positioned on top of the pin shaft 324. Pin shaft 324 has a plurality of ribs 328 that extend the entire length of the shaft. Shaft 354 also has two flexible legs 325 with two locking nubs 326 that extend outwardly from the shaft. Legs 325 are long enough and flexible enough to allow the locking nubs 326 to be pinched closer together. Legs 325 will have enough spring tension so that once any force used to pinch nubs 326 closer together is removed, the nubs will expand back out to their original position.

[0102] Referring back to FIG. 32, in order to join two panels 300 together, pin 324 is inserted through each of the pin’s receptacles 348 in order to join the christmas tree connectors 318 of the left end post 307 to the christmas tree connectors on the right end post. As pin 324 is inserted, each of the ribs 328 fit into and interact with grooves 323. The interaction between ribs 328 and grooves 323 will prevent panel 300 from being able to freely pivot about pin 324. Thus, unlike the previously described embodiments, panels 300 will be joined together and held in position by pins 324 and will not be able to pivot. Panels 300 can still be positioned into any of the arrangements shown in FIGS. 5-6c by positioning the panels relative to one another in the desired pattern and then inserting pin 324. If a new pattern is desired, pins 324 can be removed and panels 300 can be rearranged. Locking nubs 326 normally have a greater width than grooves 323 and pin head 327 has a diameter that is larger than opening 322, so that once pin 324 passes through both pin receptacles 348, the locking nubs and the pin head will prevent the pin from being removed. Thus, to remove pin 327 from receptacles 348, locking nubs 326 must be pinched closer together until they clear the edge of opening 322 so that the pin 324 can be pulled through opening 322 and removed.

[0103] All of the described embodiments of these fence panels may be manufactured by a variety of methods known in the art, including blow molding, extrusion molding, injection molding or rotational molding. The preferred method currently being extrusion molding for the rails and cylindrical members and injection molding for the clamping bodies.

[0104] While exemplary embodiments of the present invention have been disclosed hereinabove, the present invention is not limited to the disclosed embodiments. Instead, this application is intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains.

We claim:
1. A portable and collapsible fence panel, comprising:
(a) a first rail section having at least one unitary double tube, said double tube comprising a first tube and a second tube, each having a hollow interior extending through said first and said second tubes;
(b) a second rail section having at least one first moveable rail positioned within the hollow interior of said double tube, so that the at least one first rail can slide into and out of the first tube;
(c) at least one end post; and
(d) at least one connector having an insert located inside a hollow end of the at least one first rail and a post receptacle positioned around the at least one end post so that the connector joins the end post to the first rail.
2. The fence panel of claim 1, further comprising a third rail section located opposite the second rail section, the third rail section having at least one second moveable rail positioned within the hollow interior of the second tube, so that the at least one second moveable rail can slide into and out of the second tube.
3. The fence panel of claim 2, wherein said first rail section comprises three double tubes.
4. The fence panel of claim 3, wherein said second rail section comprises three first moveable rails.
5. The fence panel of claim 4, wherein said third rail section comprises at least three second moveable rails.
6. The fence panel of claim 5, wherein the at least one end post comprises a first end post and a second end post.
7. The fence panel of claim 6, wherein the at least one connector comprises six connectors with three connectors joining the first end posts to the three first moveable rails and with three connectors joining the second end posts to the three second moveable rails, respectively.
8. The fence panel of claim 7, wherein each of the three first moveable rails and each of the three second moveable rails have at least one locking tab receiving hole formed therethrough to a hollow interior thereof.
9. The fence panel of claim 8, wherein each of the inserts of the six connectors has at least one locking tab extending therefrom that interacts with the at least one locking tab receiving hole, to lock each of the connectors in place in the first and second moveable rails, respectively, when said insert is inserted into said hollow interior of the first and second moveable rails.

10. The fence panel of claim 9, further comprising a first extension and a second extension, wherein the first extension is arranged and disposed so that it can slide into and out of a hollow interior of said first end post and wherein the second extension is arranged and disposed so that it can slide into and out of a hollow interior of said second end post.

11. The fence panel of claim 10, wherein each of said first end post, said second post, said first extension and said second extension have at least one button receiving hole formed therethrough to the hollow interior thereof.

12. The fence panel of claim 11, wherein each first and second extensions have a hollow interior and a spring retention device with at least one protrusion arranged and disposed within the hollow interior of said first and second extensions, so that the at least one protrusion extends through each of the first and second extensions at least one button receiving hole and interacts with the first and second end posts' at least one button receiving hole, respectively, to lock said first and second extensions to said first and second end posts in a fully extended position.

13. The fence panel of claim 1, wherein the at least one connector is at least one Christmas tree connector.

14. The fence panel of claim 13, wherein the at least one Christmas tree connector is spot welded to the at least one end post.

15. The fence panel of claim 1, wherein the first tube of the at least one double tube and the at least one first moveable rail each have at least one button receiving hole.

16. The fence panel of claim 15, wherein the at least one first moveable rail has a hollow interior and a spring retention device, with at least one protrusion, arranged and disposed in the hollow interior of the at least one first moveable rail, so that the at least one protrusion extends through the at least one first moveable rail’s one button receiving hole and interacts with the first tube’s at least one button receiving hole to lock the at least one first moveable rail in place in its fully extended position.

17. A method of forming a fence from collapsible panels, said method comprising the steps of:

(a) providing at least two expandable and collapsible fence panels each having at least one end post and a plurality of connectors positioned on the at least one end post, each of the plurality of connectors having a pin receptacle with a plurality of grooves;

(b) providing at least one pin having a shaft with a plurality of ribs and a pin head;

(c) expanding horizontally and vertically each of the at least two panels; and

(d) connecting the at least two fence panels together by inserting the at least one pin into one of the pin receptacles of one of the plurality of connectors on each of the end posts, so that the ribs of the pin interact with the grooves of the pin receptacle to prevent the at least two panels from freely pivoting about the at least one pin.

18. The method of claim 17, further comprising the step of disassembling the at least two fence panels by removing the pin.

19. The method of claim 17, further comprising removing the panels from a carrying bag prior to step (e).

20. The method of claim 17, further comprising placing the assembled fence against a trailer, whereby the trailer forms a side of the fence.

21. The method of claim 17, further comprising connecting one of the panels to a pin receptacle mounted on the trailer.

22. The method of claim 17, wherein each fence panel comprises:

(a) a first rail section with at least one unitary double rail, said double rail comprising a first tube and a second tube, each having a hollow interior extending through the first and second tube;

(b) a second rail section having at least one first moveable rail positioned within the hollow interior of the first tube of said double tube, so that the at least one first rail can slide into and out of the first tube;

(c) at least one end post; and

(d) at least one connector having an insert located inside a hollow end of the at least one first rail and a post receptacle positioned around the at least one end post, so that the connector joins the end post to the first rail.