CLAIMS

WHAT IS CLAIMED IS:

1. A linear pipe tensioner comprising:

a frame having an upper frame member and a lower frame member, the upper frame member being pivotally secured to the lower frame member, the upper frame member having a closed position and a plurality of opened positions;

an upper track assembly having an upper track operatively associated with two upper axles, the upper track assembly being secured to the upper frame member;

a lower track assembly having a lower track operatively associated with two lower axles, the lower track assembly being secured to the lower frame member below the upper track to define a pathway between the upper track and the lower track; and

a pivot assembly, the pivot assembly being operatively associated with the upper frame member and the lower frame member wherein the pivot assembly pivots the upper frame member from the closed position toward one of the plurality of opened positions and from the plurality of opened positions toward the closed position.

2. The linear pipe tensioner of claim 1, wherein the pivot assembly comprises a hydraulic cylinder pivotally connected to the lower frame.

3. The linear pipe tensioner of claim 2, wherein the pivot assembly further comprises two hinge members, each hinge member comprising a bracket and a pin.

4. A linear pipe tensioner comprising:

a frame;

a first track assembly having a first track operatively associated with two first track axles, the first track assembly being secured to the frame;

a second track assembly having a second track operatively associated with two second track axles, the second track assembly being secured to the frame above the first track to define a pathway between the first track and the second track for receiving a pipe; and

a first roller assembly operatively associated with the first track, the first roller assembly having a first roller operatively associated a first roller carriage, the first roller carriage being pivotally connected to a first hydraulic piston operatively associated with a first hydraulic cylinder, the first hydraulic cylinder having a first hydraulic accumulator disposed within the first hydraulic cylinder.

5. The linear pipe tensioner of claim 4, wherein the first hydraulic cylinder is operatively associated with a swivel member for rotational movement of the first hydraulic piston.

6. The linear pipe tensioner of claim 4, further comprising a second roller assembly operatively associated with the first track, the second roller assembly having a second roller operatively associated a second roller carriage, the second roller carriage being pivotally connected to a second hydraulic piston operatively with a second hydraulic cylinder, the second hydraulic cylinder having a second hydraulic accumulator disposed within the second hydraulic cylinder,

wherein, the first roller carriage is pivotally connected to the second roller carriage.

7. The linear pipe tensioner of claim 6, wherein the first roller carriage is pivotally connected to the second roller carriage by a bar having first and second slots, the first slot operatively associated with a first pin operatively associated with the first roller carriage and the second slot operatively associated with a second pin operatively associated with the second roller carriage.

8. The linear pipe tensioner of claim 7, wherein the first hydraulic cylinder is operatively associated with a first swivel member for rotational movement of the first hydraulic piston and the second hydraulic cylinder is operatively associated with a second swivel member for rotational movement of the second hydraulic piston.

9. The linear pipe tensioner of claim 8, wherein the first roller assembly comprises a plurality of rollers operatively associated with the first roller carriage and the second roller assembly comprises a plurality of rollers operatively associated with the second roller carriage.

10. The linear pipe tensioner of claim 4, further comprising a second roller assembly operatively associated with the second track, the second roller assembly having a second roller operatively associated a second roller carriage, the second roller carriage being pivotally connected to a second hydraulic piston operatively associated with a second hydraulic cylinder, the second hydraulic cylinder having a second hydraulic accumulator disposed within the second hydraulic cylinder.

11. The linear pipe tensioner of claim 4, wherein the first track comprises a plurality of first track roller assemblies operatively associated with the first track, each of the first track roller assemblies having a roller operatively associated a roller carriage, the roller carriage being pivotally connected to a hydraulic piston operatively associated with a hydraulic cylinder, the hydraulic cylinder having a hydraulic accumulator disposed within the hydraulic cylinder, and

wherein the second track comprises a plurality of second track roller assemblies operatively associated with the second track, each of the second track roller assemblies having a roller operatively associated a roller carriage, the roller carriage being pivotally connected to a hydraulic piston operatively associated with a hydraulic cylinder, the hydraulic cylinder having a hydraulic accumulator disposed within the hydraulic cylinder.

12. A linear pipe tensioner comprising:

a frame;

a first track assembly secured to the frame, the first track assembly having a first track operatively associated with two first track axles, the first track having a first gripping pad, the first gripping pad having a first compliant member having a first slot and a first gripping member disposed within the first slot; and

a second track assembly having a second track operatively associated with two second track axles, the second track assembly being secured to the frame above the first track to define a pathway between the first track and the second track for receiving a pipe.

13. The linear pipe tensioner of claim 12, wherein the first gripping member protrudes through the first slot during compression of the first compliant member.

14. The linear pipe tensioner of claim 13, wherein the first gripping member is fully disposed within the first slot prior to compression of the first compliant member.

15. The linear pipe tensioner of claim 14, wherein the first gripping member is disposed on a first gripping member plate with the first gripping member being disposed within the first slot of the first compliant member.

16. The linear pipe tensioner of claim 12, wherein the first gripping pad comprises three gripping members, each of the three gripping members being disposed in a corresponding slot within the first compliant member.

17. The linear pipe tensioner of claim 16, wherein each of the gripping members comprise a rectangular-shape having an upper end, the upper end having at least one chamfer to provide a point.

18. The linear pipe tensioner of claim 17, wherein each of the gripping members is disposed at a non-right angle relative to a lateral axis and a longitudinal axis of the first gripping pad.

19. The linear pipe tensioner of claim 12, wherein the second track includes a second gripping pad, the second gripping pad having a second compliant member having a second slot and a second gripping member disposed within the second slot.

20. The linear pipe tensioner of claim 12, wherein the first track includes a plurality of first track gripping pads operatively associated with the first track, each of the first track gripping pads having a compliant member having a slot and a gripping member disposed within the slot, and

wherein the second track includes a plurality of second track gripping pads operatively associated with the second track, each of the second track gripping pads having a compliant member having a slot and a gripping member disposed within the slot.

21. A linear pipe tensioner comprising:

a frame;

a first track assembly secured to the frame, the first track assembly having a first track operatively associated with two first track axles, and a first drive assembly operatively associated with at least one of the two first track axles, the first drive assembly being in fluid communication with a hydraulic motor through a transfer valve; and

a second track assembly having a second track operatively associated with two second track axles and a second drive assembly operatively associated with at least one of the two second track axles, the second drive assembly being in fluid communication with the hydraulic motor through the transfer valve,

wherein the transfer valve comprises a first setting in which a hydraulic fluid flows simultaneously to the first and second drive assemblies, and a second setting in which the hydraulic fluid flows to the first or second drive assembly and then to the other of the first or second drive assembly, the transfer valve being actuatable between the first and second settings.

22. A method of linearly transporting a pipe segment, the method comprising the steps of:

(a) placing a pipe segment between a first track and a second track of a linear pipe tensioner, the first track operatively associated with a first drive assembly and the second track operatively associated with a second drive assembly, the first and second drive assemblies operatively associated with a hydraulic power unit and a valve disposed between the first and second drive assemblies and the hydraulic power unit, the valve having a first valve position in which a hydraulic fluid flows to the first and second drive assemblies simultaneously, and a second valve position in which the hydraulic fluid flows from either the first drive assembly to the second drive assembly or the second drive assembly to the first drive assembly;

(b) actuating the first and second drive assemblies causing the pipe section to move linearly through the first and second tracks; and

(c) modifying the rotation of the first and second tracks by actuating the valve from either the first valve position to the second valve position or from the second valve position to the first valve position.

23. The method of claim 22, wherein during step (b), a plurality of compliant members disposed on corresponding gripping pads are compressed causing a plurality of gripping members to engage the pipe segment.

24. The method of claim 22, wherein during step (b), at least one of either the first track or the second track moves vertically in response to a change in an outer diameter of the pipe segment.

25. The method of claim 22, wherein during step (b), at least one of either the first track or the second track rotate in response to a change in an outer diameter of the pipe segment.

26. The method of claim 22, wherein during step (a), the first track is moved pivotally in a first direction from a closed position to an opened position to facilitate placement of the pipe segment between the first and second tracks and then moved pivotally in a second direction from the opened position to the closed position to engage the first track with the pipe segment.

27. The method of claim 22, wherein during step (c), the valve is actuated from the first valve position to the second valve position.

28. The method of claims 22, wherein during step (c), the valve is actuated from the second valve position to the first valve position.

CLAIMS

1. A linear pipe tensioner comprising:

a frame;

a first track assembly having a first track operatively associated with two first track axles, the first track assembly being secured to the frame;

a second track assembly having a second track operatively associated with two second track axles, the second track assembly being secured to the frame above the first track to define a pathway between the first track and the second track for receiving a pipe;

a first roller assembly operatively associated with the first track, the first roller assembly having a first roller operatively associated with a first roller carriage, the first roller carriage being pivotally connected to a first hydraulic piston operatively associated with a first hydraulic cylinder, the first hydraulic cylinder having a first hydraulic accumulator disposed within the first hydraulic cylinder, the first hydraulic cylinder operatively associated with a first swivel member for rotational movement of the first hydraulic piston; and

a second roller assembly operatively associated with the first track, the second roller assembly having a second roller operatively associated with a second roller carriage, the second roller carriage being pivotally connected to a second hydraulic piston operatively associated with a second hydraulic cylinder, the second hydraulic cylinder having a second hydraulic accumulator disposed within the second hydraulic cylinder, the second hydraulic cylinder operatively associated with a second swivel member for rotational movement of the second hydraulic piston,

wherein the first roller carriage is pivotally connected to the second roller carriage by a bar having first and second slots, and wherein the first slot is operatively associated with a first pin operatively associated with the first roller carriage and the second slot is operatively associated with a second pin operatively associated with the second roller carriage.

2. The linear pipe tensioner of claim 1, wherein the first roller assembly comprises a plurality of rollers operatively associated with the first roller carriage and the second roller assembly comprises a plurality of rollers operatively associated with the second roller carriage.

3. A linear pipe tensioner comprising:

a frame;

a first track assembly secured to the frame, the first track assembly having a first track operatively associated with two first track axles, the first track having a first gripping pad, the first gripping pad having a first compliant member having at least three slots, and at least three gripping members disposed within the respective slots, the gripping members comprising a rectangular shape having an upper end, the upper end having at least one chamber to provide a point, the three gripping members being disposed in their corresponding slots within the first compliant member at non-right angles relative to a lateral axis and a longitudinal axis of the first gripping pad; and

a second track assembly having a second track operatively associated with two second track axles, the second track assembly being secured to the frame above the first track to define a pathway between the first track and the second track for receiving a pipe.

4. The linear pipe tensioner of claim 3, wherein the gripping members protrude through their respective slots during compression of the first compliant member.

5. The linear pipe tensioner of claim 4, wherein the gripping members are fully disposed within their respective slots prior to compression of the first compliant member.

6. The linear pipe tensioner of claim 5, wherein the gripping members are disposed on a first gripping member plate.

7. The linear pipe tensioner of claim 3, wherein the second track includes a second gripping pad, the second gripping pad having a second compliant member having a second slot and a second gripping member disposed within the second slot.

8. The linear pipe tensioner of claim 3, wherein the first track includes a plurality of first track gripping pads operatively associated with the first track, each of the first track gripping pads having a compliant member having a slot and a gripping member disposed within the slot, and

wherein the second track includes a plurality of second track gripping pads operatively associated with the second track, each of the second track gripping pads having a compliant member having a slot and a gripping member disposed within the slot.

9. A linear pipe tensioner comprising:

a frame;

a first track assembly secured to the frame, the first track assembly having a first track operatively associated with two first track axles, and a first drive assembly operatively associated with at least one of the two first track axles, the first drive assembly being in fluid communication with a hydraulic motor through a transfer valve, the first track assembly having a first gripping pad, the first gripping pad having a first compliant member having at least three slots, and at least three gripping members disposed within the respective slots, the gripping members comprising a rectangular shape having an upper end, the upper end having at least one chamber to provide a point, the three gripping members being disposed in their corresponding slots within the first compliant member at non-right angles relative to a lateral axis and a longitudinal axis of the first gripping pad; and

a second track assembly having a second track operatively associated with two second track axles and a second drive assembly operatively associated with at least one of the two second track axles, the second drive assembly being in fluid communication with the hydraulic motor through the transfer valve,

wherein the transfer valve comprises a first setting in which a hydraulic fluid flows simultaneously to the first and second drive assemblies, and a second setting in which the

hydraulic fluid flows to the first or second drive assembly and then to the other of the first or second drive assembly, the transfer valve being actuatable between the first and second settings.

10. A linear pipe tensioner comprising:

a frame;

a first track assembly having a first track operatively associated with two first track axles, the first track assembly being secured to the frame;

a second track assembly having a second track operatively associated with two second track axles, the second track assembly being secured to the frame above the first track to define a pathway between the first track and the second track for receiving a pipe;

a first roller assembly operatively associated with the first track, the first roller assembly having a first roller operatively associated with a first roller carriage, the first roller carriage being pivotally connected to a first hydraulic piston operatively associated with a first hydraulic cylinder, the first hydraulic cylinder operatively associated with a first swivel member for rotational movement of the first hydraulic piston; and

a second roller assembly operatively associated with the first track, the second roller assembly having a second roller operatively associated with a second roller carriage, the second roller carriage being pivotally connected to a second hydraulic piston operatively associated with a second hydraulic cylinder, the second hydraulic cylinder operatively associated with a second swivel member for rotational movement of the second hydraulic piston,

wherein the first roller carriage is pivotally connected to the second roller carriage by a bar having first and second slots, and wherein the first slot is operatively associated with a first pin operatively associated with the first roller carriage and the second slot is operatively associated with a second pin operatively associated with the second roller carriage.

11. The linear pipe tensioner of claim 10, further comprising a third roller assembly

operatively associated with the second track, the third roller assembly having a third roller operatively associated with a third roller carriage, the third roller carriage being pivotally connected to a third hydraulic piston operatively associated with a third hydraulic cylinder.

12. The linear pipe tensioner of claim 10, wherein the first track further comprises a plurality of first track roller assemblies operatively associated with the first track, each of the first track roller assemblies having a roller operatively associated with a roller carriage, the roller carriage being pivotally connected to a hydraulic piston operatively associated with a hydraulic cylinder, and

wherein the second track comprises a plurality of second track roller assemblies operatively associated with the second track, each of the second track roller assemblies having a roller operatively associated with a roller carriage, wherein the roller carriage is pivotally connected to a hydraulic piston operatively associated with a hydraulic cylinder, and wherein the hydraulic cylinders are operatively associated with swivel members for rotational movement of the hydraulic pistons.

13. The linear pipe tensioner of claim 12, wherein adjacent roller assemblies are pivotally connected by means of a slotted bar in operative association with the adjacent roller carriages.

14. The linear pipe tensioner of claim 10, wherein the first roller assembly comprises a plurality of rollers operatively associated with the first roller carriage and the second roller assembly comprises a plurality of rollers operatively associated with the second roller carriage.