

## CLAIMS

What is claimed is:

1. A system for replacing a drive assembly of a turntable load station, the system comprising:

a structural pier;

a track formed on a top surface of the structural pier;

a movable turntable structure;

a first bogie assembly detachably coupled to an underside of the movable turntable structure, the first bogie assembly comprising a first wheeled drive assembly configured to drive a wheel to roll on the track;

a swap rail mounted to a radial side surface of the structural pier; and

a first translating cartridge movably mounted to the swap rail in a serviceable orientation, the first translating cartridge configured to pivot from the serviceable orientation to an upright functional orientation to couple with the first wheeled drive assembly and decouple the first wheeled drive assembly coupled to the first translating cartridge from the first bogie assembly or decouple the first bogie assembly comprising the first wheeled drive assembly coupled to the first translating cartridge from the movable turntable structure.

2. The system of claim 1, wherein the first translating cartridge is configured to move along the radial side surface of the structural pier via the swap rail while in the serviceable orientation to an unloading position underneath the first bogie assembly coupled to the movable turntable structure.

3. The system of claim 2, wherein the first translating cartridge is configured to:

pivot from the upright functional orientation to the serviceable orientation while coupled to the first wheeled drive assembly; and

move along the radial side surface of the structural pier via the swap rail while in the serviceable orientation and coupled to the first wheeled drive assembly to a position away from the unloading position.

4. The system of claim 1, wherein the first translating cartridge comprises:
- an adapter plate detachably coupled to an underside of the first wheeled drive assembly;
  - a tilting slide carriage coupled to an underside of the adapter plate, the tilting slide carriage configured to pivot the translating cartridge between the serviceable orientation and the upright functional orientation; and
  - one or more slide rails coupled to the underside of the adapter plate, the one or more slide rails configured to:
    - slide the first translating cartridge in the upright functional orientation toward the first bogie assembly to couple the adapter plate to the first wheeled drive assembly,
    - slide the first translating cartridge in the upright functional orientation away from the first bogie assembly when the adapter plate is coupled to the first wheeled drive assembly and the first wheeled drive assembly is decoupled from the first bogie assembly, or
    - slide the first translating cartridge in the upright functional orientation away from the movable turntable structure when the adapter plate is coupled to the first wheeled drive assembly and the first bogie assembly comprising the first wheeled drive assembly is decoupled from the movable turntable structure.
5. The system of claim 4, further comprising:
- a counterbalance pivot formed between the first translating cartridge and the swap rail, the counterbalance pivot configured to offset a weight of the first wheeled drive assembly coupled to the first translating cartridge when the first translating cartridge pivots between the serviceable orientation and the upright functional orientation.
6. The system of claim 1, wherein:
- the first bogie assembly is configured to couple the wheel to the underside of the movable turntable structure; and
  - the movable turntable structure is caused to rotate about an axis when the first wheeled drive assembly drives the wheel to roll on the track.

7. The system of claim 6, wherein the movable turntable structure is configured to rotate about the axis to move the first bogie assembly to an unloading position above the first translating cartridge.

8. The system of claim 4, further comprising a second translating cartridge movably mounted to the swap rail in the serviceable orientation, the second translating cartridge coupled to a second wheeled drive assembly or a second bogie assembly comprising the second wheeled drive assembly and configured to:

pivot from the serviceable orientation to the upright functional orientation while coupled to the second wheeled drive assembly or the second bogie assembly comprising the second wheeled drive assembly;

couple the second wheeled drive assembly to the first bogie assembly or couple the second bogie assembly comprising the second wheeled drive assembly to the underside of the movable turntable structure;

decouple from the second wheeled drive assembly or the second bogie assembly comprising the second wheeled drive assembly; and

pivot from the upright functional orientation to the serviceable orientation while decoupled from the second wheeled drive assembly coupled to the first bogie assembly or while decoupled from the second bogie assembly comprising the second wheeled drive assembly coupled to the underside of the movable turntable structure.

9. The system of claim 8, wherein the second translating cartridge comprises:

a second adapter plate detachably coupled to an underside of the second wheeled drive assembly;

a second tilting slide carriage coupled to an underside of the second adapter plate, the second tilting slide cartridge configured to pivot the second translating cartridge between the serviceable orientation and the upright functional orientation; and

one or more second slide rails coupled to the underside of the second adapter plate, the one or more second slide rails configured to:

slide the second translating cartridge in the upright functional orientation to couple the second wheeled drive assembly to the first bogie assembly while the second adapter plate is coupled to the second wheeled drive assembly,

slide the second translating cartridge in the upright functional orientation to couple the second bogie assembly comprising the second wheeled drive assembly to

the underside of the movable turntable structure while the second adapter plate is coupled to the second wheeled drive assembly,

slide the second translating cartridge in the upright functional orientation away from the first bogie assembly when the second wheeled drive assembly is coupled to the first bogie assembly and the second adapter plate is decoupled from the second wheeled drive assembly, or

slide the second translating cartridge in the upright functional orientation away from the movable turntable structure when the second bogie assembly comprising the second wheeled drive assembly is coupled to the underside of the movable turntable structure and the second adapter plate is decoupled from the second wheeled drive assembly.

10. The system of claim 9, further comprising:

a second counterbalance pivot formed between the second translating cartridge and the swap rail, the second counterbalance pivot configured to offset a weight of the second wheeled drive assembly coupled to the second translating cartridge when the second translating cartridge pivots between the serviceable orientation and the upright functional orientation.

11. The system of claim 9, wherein the second translating cartridge is configured to:

move along the radial side surface of the structural pier via the swap rail while in the serviceable orientation and coupled to the second wheeled drive assembly to a loading position underneath the first bogie assembly decoupled from the first wheeled drive assembly or underneath a location of the movable turntable structure at which the first bogie assembly comprising the first wheeled drive assembly is decoupled from the movable turntable structure; and

move along the radial side surface of the structural pier via the swap rail while in the serviceable orientation and decoupled from the second wheeled drive assembly to a position away from the loading position.

12. A method for replacing a drive assembly of a turntable load station, the method comprising:

identifying for replacement a first bogie assembly detachably coupled to an underside of a movable turntable structure, the first bogie assembly comprising a first

wheeled drive assembly configured to drive a wheel to roll on a track formed on a top surface of a structural pier;

moving a first translating cartridge along a radial side surface of the structural pier while in a serviceable orientation to an unloading position underneath the first bogie assembly coupled to the movable turntable structure;

pivoting the first translating cartridge from the serviceable orientation to an upright functional orientation;

coupling the first translating cartridge to the first wheeled drive assembly while in the upright functional orientation; and

decoupling the first wheeled drive assembly coupled to the first translating cartridge from the first bogie assembly or decoupling the first bogie assembly comprising the first wheeled drive assembly coupled to the first translating cartridge from the movable turntable structure.

13. The method of claim 12, further comprising:

pivoting the first translating cartridge from the upright functional orientation to the serviceable orientation while coupled to the first wheeled drive assembly; and

moving the first translating cartridge along the radial side surface of the structural pier while in the serviceable orientation and coupled to the first wheeled drive assembly to a position away from the unloading position.

14. The method of claim 13, wherein the pivoting of the first translating cartridge from the upright functional orientation to the serviceable orientation comprises:

offsetting a weight of the first wheeled drive assembly coupled to the first translating cartridge when the first translating cartridge pivots from the upright functional orientation to the serviceable orientation.

15. The method of claim 12, wherein the first bogie assembly is configured to couple the wheel to the underside of the movable turntable structure and the movable turntable structure is caused to rotate about an axis when the first wheeled drive assembly drives the wheel to roll on the track.

16. The method of claim 15, further comprising:

rotating the movable turntable structure about the axis to move the first bogie assembly to the unloading position above the first translating cartridge.

17. The method of claim 12, further comprising:

moving a second translating cartridge coupled to a second wheeled drive assembly or a second bogie assembly comprising the second wheeled drive assembly along the radial side surface of the structural pier while in the serviceable orientation to a loading position underneath the first bogie assembly decoupled from the first wheeled drive assembly or underneath a location of the movable turntable structure at which the first bogie assembly comprising the first wheeled drive assembly is decoupled from the movable turntable structure;

pivoting the second translating cartridge from the serviceable orientation to the upright functional orientation while coupled to the second wheeled drive assembly or the second bogie assembly comprising the second wheeled drive assembly;

coupling the second wheeled drive assembly to the first bogie assembly or coupling the second bogie assembly comprising the second wheeled drive assembly to the underside of the movable turntable structure;

decoupling the second translating cartridge from the second wheeled drive assembly or from the second bogie assembly comprising the second wheeled drive assembly; and

pivoting the second translating cartridge from the upright functional orientation to the serviceable orientation while decoupled from the second wheeled drive assembly coupled to the first bogie assembly or while decoupled from the second bogie assembly comprising the second wheeled drive assembly coupled to the underside of the movable turntable structure.

18. The method of claim 17, wherein the pivoting of the second translating cartridge from the serviceable orientation to the upright functional orientation comprises:

offsetting a weight of the second wheeled drive assembly coupled to the second translating cartridge when the second translating cartridge pivots from the serviceable orientation to the upright functional orientation.

19. The method of claim 17, further comprising:

moving the second translating cartridge along the radial side surface of the structural pier while in the serviceable orientation and decoupled from the second wheeled drive assembly to a position away from the loading position.

20. A turntable load station, the turntable load station comprising:
- a structural pier;
  - a track formed on a top surface of the structural pier;
  - a movable turntable structure;
  - a first bogie assembly detachably coupled to an underside of the movable turntable structure, the first bogie assembly comprising a first wheeled drive assembly configured to drive a wheel to roll on the track, wherein the movable turntable structure is caused to rotate about an axis when the wheel rolls on the track;
  - a swap rail mounted to a radial side surface of the structural pier; and
  - a first translating cartridge movably mounted to the swap rail in a serviceable orientation, the first translating cartridge configured to:
    - move along the radial side surface of the structural pier via the swap rail while in the serviceable orientation to an unloading position underneath the first bogie assembly coupled to the movable turntable structure,
    - pivot from the serviceable orientation to an upright functional orientation to couple with the first wheeled drive assembly,
    - decouple the first wheeled drive assembly coupled to the first translating cartridge from the first bogie assembly or decouple the first bogie assembly comprising the first wheeled drive assembly coupled to the first translating cartridge from the movable turntable structure, and
    - pivot from the upright functional orientation to the serviceable orientation while coupled to the first wheeled drive assembly.

21. The turntable load station of claim 20, further comprising a second translating cartridge movably mounted to the swap rail in the serviceable orientation, the second translating cartridge coupled to a second wheeled drive assembly or a second bogie assembly comprising the second wheeled drive assembly and configured to:
- move along the radial side surface of the structural pier while in the serviceable orientation to a loading position underneath the first bogie assembly decoupled from the first wheeled drive assembly or underneath a location of the movable turntable structure

at which the first bogie assembly comprising the first wheeled drive assembly is decoupled from the movable turntable structure;

pivot from the serviceable orientation to the upright functional orientation while coupled to the second wheeled drive assembly or the second bogie assembly comprising the second wheeled drive assembly;

couple the second wheeled drive assembly to the first bogie assembly or couple the second bogie assembly comprising the second wheeled drive assembly to the underside of the movable turntable structure;

decouple from the second wheeled drive assembly or the second bogie assembly comprising the second wheeled drive assembly; and

pivot from the upright functional orientation to the serviceable orientation while decoupled from the second wheeled drive assembly coupled to the first bogie assembly or while decoupled from the second bogie assembly comprising the second wheeled drive assembly coupled to the underside of the movable turntable structure.