CLAIMS

1. A system for automatically connecting at least one service line on a truck to a trailer comprising:

a receiver on the trailer that is permanently or temporarily affixed thereto, the receiver interconnected with at least one of a pneumatic line and an electrical line;

a coupling that is manipulated by an end effector of a robotic manipulator to find and engage the receiver when the trailer is brought into proximity with, or hitched to, the truck;

a processor that, in response to a position of the receiver, moves the manipulator to align and engage the coupling with the receiver so as to complete a circuit between the truck and the trailer; and

a clamping assembly that selectively overlies an annular seal of a glad hand on the trailer and that sealingly clamps a truck-based pneumatic line connector to the annular seal.

2. The system as set forth in claim 1, wherein the end effector is mounted on at least one of (a) a framework moving along at least two orthogonal axes and having a rearwardly extending arm, (b) a multi-degree-of-freedom robot arm, and (c) a linear-actuator-driven arm with pivoting joints to allow for concurrent rearward extension and height adjustment.

3. The system as set forth in claim 2, wherein the linear-actuator-driven arm is mounted on a laterally moving base on the truck chassis.

4. The system as set forth in claim 3, wherein a pivoting joint attached to the end effector includes a rotary actuator to maintain a predetermined angle in the coupling.

5. The system as set forth in claim 1, wherein the coupling includes an actuated, quick-disconnect-style fitting adapted to selectively and sealingly secure to a connector in the receptacle.

6. The system as set forth in claim 5, wherein the actuated, quick-disconnect-style fitting comprises a magnetic solenoid assembly that selectively and slidably opens and allows closure of the quick-disconnect-style fitting in response, to application of electrical current thereto.

7. The system as set forth in claim 1, further comprising a tensioned cable attached to the coupling and a pneumatic line attached to the truck brake system.

8. The system as set forth in claim 7, wherein the brake system comprises at least one of a service brake and an emergency brake.

9. The system as set forth in claim 8, further comprising an electrical connection on the coupling attached to the truck electrical system.

10. The system as set forth in claim 9, wherein the receptacle is removably attached to a front face of the trailer by at least one of an interengaging fabric material, fasteners, clamps and magnets.

11. The system as set forth in claim 10, further comprising a retrofit kit for the trailer defining a Y-connector for at least one of a trailer pneumatic line and a trailer electrical line, the Y-connector connecting to both a conventional service connector and the receiver.

12. The system as set forth in claim 11, wherein the Y-connector is operatively connected to a venting mechanism that selectively allows one of the coupling and the conventional service connector to vent.

13. The system as set forth in claim 12, wherein the conventional service connector comprises a glad hand.

14. The system as set forth in claim 1 wherein the clamping assembly includes a spring-loaded clamp that is normally closed and is opened by a gripping action of the end effector.

15. The system as set forth in claim 1 wherein the clamping assembly includes an actuated clamp having one of (a) a pivoting pair of clamping members and (b) a sliding clamping member.

16. A system for automatically connecting at least one service line on a truck to a trailer comprising:

a receiver on the trailer that is permanently or temporarily affixed thereto, the receiver interconnected with at least one of a pneumatic line and an electrical line;

a coupling that is manipulated by an end effector of a robotic manipulator to find and engage the receiver when the trailer is brought into proximity with, or hitched to, the truck; and

a processor that, in response to a position of the receiver, moves the manipulator to align and engage the coupling with the receiver so as to complete a circuit between the truck and the trailer; and

a probe member, containing a pressure port, that inserts into and becomes lodged in an annular seal of the trailer glad hand based upon a placement motion of the end effector.

17. The system as set forth in claim 16 wherein the probe member comprises one of (a) a frustoconical plug that is releasable press fit into the annual seal and (b) an inflatable plug that selectively engages a cavity in the glad hand beneath the annular seal and is inflated to become secured therein.

18. The system as set forth in claim 17 wherein the frustoconical plug includes a circumferential barb to assist in retaining against the annular seal.

19. A system for attaching a truck-based pneumatic line connector to a trailer glad hand on a trailer using a robotic manipulator with an end effector that selectively engages and releases the pneumatic line connector comprising:

a receiver on the trailer that is permanently or temporarily affixed thereto, the receiver interconnected with at least one of a pneumatic line and an electrical line;

a coupling that is manipulated by the end effector of the robotic manipulator to find and engage the receiver when the trailer is brought into proximity with, or hitched to, the truck;

a processor that, in response to a position of the receiver, moves the manipulator to align and engage the coupling with the receiver so as to complete a circuit between the truck and the trailer; and

another glad hand secured to the trailer glad hand in a substantially conventional manner, the other glad hand including a quick-disconnect fitting that receives the pneumatic line connector from the end effector.

20. A system for automatically connecting at least one service line on a truck to a trailer comprising:

a glad hand on the trailer that is permanently or temporarily affixed thereto, the glad hand interconnected with a trailer-based pneumatic line;

a coupling assembly that is manipulated by an end effector of a robotic manipulator to find and engage the glad hand when the trailer is brought into proximity with, or hitched to, the truck;

a processor that, in response to a position of the glad hand, moves the manipulator to align and engage the coupling with the glad hand so as to complete a circuit between the truck and the trailer; and

the coupling assembly selectively overlies an annular seal of the glad hand on the trailer and sealingly engages a truck-based pneumatic line.