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(54) Title: SYSTEM FOR REMOTELY CONTROLLING A MATERIALS HANDLING VEHICLE

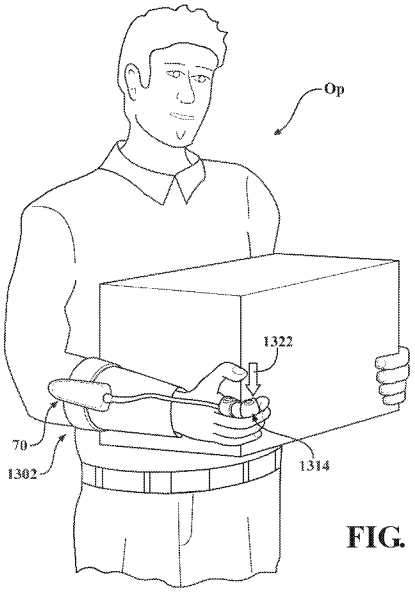

FIG. 16

(57) Abstract: A supplemental control system for a materials handling vehicle comprises a wearable control device, and a corresponding receiver on the materials handling vehicle. The wearable control device is donned by an operator interacting with the materials handling vehicle, and comprises a wireless transmitter to be worn on the wrist of the operator and a travel control communicably coupled to the wireless transmitter. Actuation of the travel control causes the wireless transmitter to transmit a first type signal designating a request to the vehicle. The receiver is supported by the vehicle for receiving transmissions from the wireless transmitter.

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1. A remote control device capable of wirelessly transmitting a travel request signal to a materials handling vehicle comprising:

a support structure adapted to be mounted on a wrist or arm of an operator;

a wireless transmitter associated with said support structure; and

control structure in communication with said wireless transmitter, said control structure adapted to be actuated by the operator so as to cause said wireless transmitter to generate a first type signal to the materials handling vehicle.

2. The remote control device of claim 1, wherein said control structure comprises a rigid mounting structure adapted to be mounted over at least one finger of the operator.

3. The remote control device of claim 1, wherein said support structure comprises a mounting strap adapted to be secured to the wrist or arm of the operator.

4. The remote control device of claim 1, wherein said wireless transmitter is releasably coupled to said control structure.

5. The remote control device of claim 4, further comprising a wire extending between said wireless transmitter and said control structure, said flexible wire providing electrical communication between said control structure said and wireless transmitter.

6. The remote control device of claim 1, wherein said wireless transmitter is in wireless communication with said control structure.

7. The remote control device of claim 1, wherein said first type signal comprises a travel request signal.

8. The remote control device of claim 7, wherein said control structure is adapted to be actuated by the operator so as to cause said wireless transmitter to generate a second type signal comprising a stop signal in response to receipt of said second type

signal so as to stop the materials handling vehicle if the vehicle is moving under wireless remote control.

9. The remote control device of claim 8, wherein said control structure must be double clicked by the operator to cause said wireless transmitter to generate said first type signal and said control structure must be single clicked by the operator to cause said wireless transmitter to generate said second type signal.

10. The remote control device of claim 7, wherein said control structure must be double clicked by the operator to cause said wireless transmitter to generate said first type signal.

11. The remote control device of claim 7, wherein multiple instances of said first type signal are required for the materials handling vehicle to implement the travel request signal.

12. The remote control device of claim 7, wherein, if no vehicle-related activity has taken place for a predetermined amount of time, said control structure must be double clicked by the operator to cause the materials handling vehicle to implement the travel request signal.

13. The remote control device of claim 7, wherein, for the first wireless command requested after the operator has stepped off the materials vehicle, said control structure must be double clicked by the operator to cause the materials handling vehicle to implement the travel request signal.

14. The remote control device of claim 1, wherein:

a single actuation of said control structure by the operator causes a single instance of said first type signal to be transmitted by said wireless transmitter to the materials handling vehicle;

a double actuation of said control structure by the operator causes a double instance of said first type signal to be transmitted by said wireless transmitter to the materials handling vehicle;

the materials handling vehicle implements a stop function if a single instance of said first type signal is received; and

the materials handling vehicle implements a travel function if a double instance of said first type signal is received.

15. The remote control device of claim 1, wherein:

a single actuation of said control structure by the operator causes a single instance of said first type signal to be transmitted by said wireless transmitter to the materials handling vehicle;

a double actuation of said control structure by the operator causes a double instance of said first type signal to be transmitted by said wireless transmitter to the materials handling vehicle;

the materials handling vehicle implements a stop function if a single instance of said first type signal is received and the materials handling vehicle is moving under wireless remote control;

the materials handling vehicle implements a stop function if a double instance of said first type signal is received and the materials handling vehicle is moving under wireless remote control;

the materials handling vehicle implements a travel function if a double instance of said first type signal is received and the materials handling vehicle is stopped; and

the materials handling vehicle does not implement a travel function if a single instance of said first type signal is received and the materials handling vehicle is stopped.

16. The remote control device of claim 1, further comprising a power pack for powering the remote control device.

17. A materials handling vehicle comprising:

a power unit;

a load handling assembly;

at least one first obstacle detector comprising a sweeping laser sensor mounted at a first location on said power unit to detect an object located in a scan zone along a path of travel of said power unit beyond a non-detect zone of said first detector; and

at least one second obstacle detector mounted at a second location on said power unit below said first detector in a vertical direction and capable of detecting an

object in said non-detect zone underneath said scan zone of said first obstacle detector.

18. The materials handling vehicle of claim 17, wherein said sweeping laser sensor is capable of detecting an object in any of first, second, and third zones, the first and third zones comprising steer bumper zones used for implementing steer correction maneuvers and the second zone comprising a stop zone used for stopping the vehicle.

19. The materials handling vehicle of claim 17, wherein said at least one second obstacle detector comprises first and second point laser sensors spaced from one another in a horizontal direction.

20. The materials handling vehicle of claim 17, wherein said non-detect zone is located just in front of the vehicle and underneath said scan zone of said first obstacle detector.

STATEMENT UNDER ARTICLE 19 (1)

Enclosed herewith are new sheets 56 thru 59, replacing originally filed sheets 56 thru 59, which originally filed sheets 56 thru 59 should be cancelled from the application identified above. The new sheets 56 thru 59 include an amendment to claim 17, and original claim 18 has been deleted, thus resulting in the renumbering of original claims 19 and 20 into 18 and 19 in the new sheets. More specifically, the limitations from original claim 18 were added into independent claim 17, resulting in the deletion of previous claim 18. Further, additional limitations from the specification as filed were added into independent claim 17, i.e., concerning the location of the at least one second obstacle detector being below the at least one first obstacle detector, and concerning the detecting zones or scan zones of the first and second obstacle detectors. Support for these limitations can be found in the application as filed, for example, at page 54, line 15 - page 55, line 7. Additionally, new claim 20 has been added, support for which can be found on page 54, line 30 - page 55, line 7 of the application as filed. Again, each of the amendments presented in new sheets 56-59 is fully supported in the application as originally filed.

Originally, 20 claims were filed. After this amendment under Article 19, there are still 20 total claims remaining. Claims 1-16 are unchanged. Claim 17 has been replaced by amended claim 17 bearing the same number. Claim 18 has been deleted, thus resulting in the renumbering of claims 19 and 20 into claims 18 and 19 in the new sheets. Claim 20 has been added.

For further clarification that the amendments to claim 17 and the limitations recited in new claim 20 are fully supported in the application as originally filed, see for example, the following excerpts from the application as originally filed:

1) Page 54, lines 11-14 recites "The first obstacle detector 2050 is spaced apart from the second obstacle detectors 2052A and 2052B along a longitudinal axis V_A of the vehicle 2010 defining a vertical direction, i.e., the second obstacle detectors 2052A and 2052B are located below, i.e., closer to the ground, than the first obstacle detector 2050, see Fig. 29."
2) Page 54, line 26 - page 55, line 7 recites "The second obstacle detectors 2052A and 2052B according to this aspect of the invention may comprise point laser sensors that are capable of detecting objects between one or more of the zones Z_1, Z_2, Z_3 and the vehicle 2010, i.e., underneath one or more of the zones Z_1, Z_2, Z_3, as illustrated in Fig. 29, and are preferably capable of at least detecting objects underneath the second zone Z_2. The second obstacle detectors 2052A and 2052B are thus capable of detecting objects located in a non-detect zone DZ of the first obstacle detector 2050, see Fig. 29, i.e., which non-detect zone DZ is defined as an area below the zones Z_1, Z_2, Z_3 and thus not sensed by the first obstacle detector 2050. Hence, the first obstacle detector 2050 functions to detect objects located along a path of travel of the power unit 2014 beyond the non-detect zone DZ, while the second obstacle detectors 2052A and 2052B function to sense objects along the path of travel of the power unit 2014 in the non-detect zone DZ, which is located just in front of the vehicle 2010, as shown in Fig. 29."