

PATENTS ACT 1977**P7536GB-JDB/KR/mf****"AN ALIGNMENT SYSTEM"**

The present invention relates to an alignment system for positioning a first object with respect to a second object and more particularly to an alignment system for aligning a chassis for holding containers with respect to a container-handling equipment.

Drivers of vehicles for transporting containers often have trouble in positioning the containers (usually supported on the vehicle by a chassis) below container-handling equipment, such as a crane. Until now drivers have had to rely on the hand signals of fellow workers in order to align the chassis for holding containers correctly under the container-handling equipment. This is a time consuming and unreliable process and often requires a certain amount of trial and error.

An aim of the present invention is, therefore, to assist drivers in aligning containers under container-handling equipment, such as a crane, more quickly and more efficiently and without the aid of fellow workers.

According to the present invention, there is provided an alignment system for use in aligning a first object with a second object, which system comprises a transmitter, for transmitting a directable signal in the form of a non-overlapping beam, the transmitter being mounted on either the first object or the second object, a receiver for receiving the signal, mounted on the other of the first object or the second object, and an indicator for indicating that a signal from the transmitter has been received by the receiver, wherein the first object comprises a chassis for holding container(s) and a prime

movers for moving the chassis and the second object comprises container-handling equipment.

Preferably, the directable signal comprises a through-beam, infra-red signal.

Preferably, the first object is movable and the second object is stationary. More preferably, the transmitter is configured to transmit the signal in a direction which is substantially perpendicular to the direction of movement of the first object.

Preferably, the container-handling equipment comprises a crane.

Preferably, the indicator is mountable on a display panel.

More preferably, the display panel is mountable on the prime-mover, so that the driver of the prime-mover is readily able to see the indicator lights.

More preferably, an indicator comprises a light, bell and/or buzzer.

Preferably, a single pair of opposed transmitters is mounted on the container-handling equipment, a single pair of opposed receivers is mounted on the prime-mover and a plurality of opposed receivers are mounted on the chassis.

Preferably, a plurality of receivers are mounted at intervals along the chassis at positions corresponding to positions midway along the lengths of containers supportable by the chassis.

Preferably, the alignment system comprises a plurality of indicators, each indicator being responsive to at least one receiver.

Preferably, at least one indicator and at least one receiver form part of a control circuit.

According to the present invention, there is also provided an alignment system for use in aligning a first object with a second object, which alignment system comprises a control circuit for controlling alignment of the first object with the second object, the control circuit comprising (a) at least one receiver, mounted on either the first object or the second object and adapted to receive a signal in the form of a non-overlapping beam from a transmitter mounted on the other of the first object or second object, (b) at least one indicator, and (c) means for activating the at least one indicator in response to a signal in the form of a non-overlapping beam being received from the transmitter, in use, by the at least one receiver, wherein the first object comprises a chassis for holding container(s) and a prime mover for moving the chassis and the second object comprises container-handling equipment.

Preferably, the control circuit comprises a first receiver, a first indicator responsive to the first receiver, and at least one second receiver, at least one second indicator responsive to the at least one second receiver, means for deactivating the first indicator in response to a signal received, in use, by the at least one second receiver and means for reactivating the first indicator a set period of time after the at least one second receiver, in use, no longer received the signal.

According to the present invention there is further provided a method of aligning a first object with a second

object, which method comprises moving the first object with respect to the second object until a receiver, mounted on the first object or second object, is aligned with and receives a signal in the form of a non-overlapping beam mounted on the other of the first object or second object, as indicated by an indicator, wherein the first object comprises a chassis for holding containers and a prime mover for moving the chassis and the second object comprises container-handling equipment.

In order to illustrate the features and advantages of the present invention, the present invention will be

5.

further described, by way of example only, and with reference to the accompanying drawings, in which:

Figure 1 shows a view from one side of the alignment system mounted according to one embodiment of the present invention;

Figure 2 shows a view from one side of the alignment system mounted according to a second embodiment of the present invention;

Figure 3 shows an example of a control circuit for use with the alignment system of the present invention;

Figure 4 shows an example of a method of aligning a first object with a second object using the alignment system of the present invention.

Referring to Figures 1 and 2, a vehicle 1 for transporting a plurality of containers 2 comprises a driving compartment or prime-mover 3 and a detachable chassis 4 for supporting a plurality of containers 2. The chassis 4 may be a double stack chassis, as shown in Figure 1, or a single stack chassis, as shown in Figure 2.

A single pair of opposed transmitters 6 for transmitting a directable signal, is mounted on a crane 7, one transmitter 6 being mounted on each side of the crane 7, on a central horizontal axis (perpendicular to the plane of Figures 1 and 2) and at an appropriate height (1.1 metres) above ground level. The directable signal transmitted by the transmitter 6 comprises an invisible, through-beam infra-red signal.

6

A single pair of opposed receivers 8 is mounted on the prime-mover 3, one receiver 8 being mounted on each side of the prime-mover 3, on a central horizontal axis (perpendicular to the plane of Figures 1 and 2) and at the same height above ground level (1.1 metres) as the pair of transmitters 6 on the crane 7.

A plurality of pairs of opposed receivers 9 are mounted on the chassis 4, one receiver 9 of each pair of receivers being mounted on either side of the chassis 4 on a horizontal axis (perpendicular to the plane of Figures 1 and 2) and at the same height above ground level (1.1 meters) as the pair of transmitters 6 on the crane 7. The pairs of opposed receivers 9 may be mounted at intervals along the chassis 4, for example, at the positions shown in Figure 1 ie. at distances of 3.05m, 6.1m and 9.35m from the front of the chassis 4 (marked X in the diagrams). In Figure 2, the pairs of opposed receivers 9 are mounted at intervals along the chassis 4, at positions corresponding to positions midway along the lengths of each of the plurality of containers 2 supported by the chassis 4 ie. at distances of 3.05m, 6.1m, 6.86m and 10m from the front X of the chassis 4.

The transmitter 6 and the receivers 8,9 are all dust-proof for maximum efficiency of signalling.

A plurality of indicators 12, 13 are mounted on a display panel or box 11, which is positioned in front of the driver in the prime-mover cabin 3. Each indicator 12,13 on the display panel 11 is responsive to a single pair of receivers 8 or 9 and indicates that a signal from the pair of transmitters 6 on the crane 7 has been received by the pair of receivers 8 or 9 on the prime-mover 3 or chassis 4, respectively. The indicator 12, which is

responsive to the single pair of opposed receivers 8 on the prime-mover 3 comprises a combined amber light and "slow-down" warning buzzer. Each of the indicators 13 is responsive to a single pair of receivers 9 on the chassis 4 and each indicator 13 comprises a red light. The red indicator lights 13 may be appropriately labelled on the display panel 11, for example, 3.05m, 6.1m and 9.35m from the front X of the chassis 4 as in the case of the example shown in Figure 1, or 3.05m, 6.1m, 6.86m and 10m from the point X of the chassis 4, as in the case of the example shown in Figure 2.

In use, the prime-mover 3 may be driven towards the crane 7 as shown in Figure 4. When a signal from the pair of transmitters 6 is received by the single pair of receivers 8 on the prime-mover 3 (step A in Figure 4), the indicator 12 comprising the amber light and "slow-down" warning buzzer is automatically activated. This indicates to the driver of the prime-mover 3 that the prime-mover 3 is correctly aligned with the central horizontal axis of the crane 7 and that the prime-mover 3 should now be slowed in preparation for alignment of the chassis 4 with the crane 7.

The driver continues to move the prime-mover 3, slowly, with respect to the crane 7, until the pair of receivers 9 nearest the front X of the chassis 4, receives a signal from the pair of transmitters 6 on the crane 7 (step B in Figure 4). At this point, the indicator 12 comprising the amber light and "slow-down" warning buzzer is automatically deactivated and a red indicator light 13, corresponding to the pair of receivers 9 which received the signal, is automatically activated. This indicates to the driver that the crane 7 is correctly aligned with a container 2. The driver, accordingly, stops the prime-

mover 3 and the crane 7 is then able to carry out handling of the container 2 (or containers 2 in the case of a double-stack chassis) positioned between the receivers of the pair of receivers 9 that received the signal.

Following handling of the container 2 by the crane 7, the driver continues to move the prime-mover 3, slowly, with respect to the crane 7, (step C in Figure 4) until the receivers of another pair of receivers 9 on the chassis 4 positioned on either side of a container 2 receive a signal from the pair of transmitters 6 on the crane 7, (step D in Figure 4). The sequence of events continues as described above until all of the pairs of receivers 9 have received a signal from the pair of transmitters 6, and until all of the plurality of containers 2 positioned between the receivers of each pair of receivers 9 have been handled.

If, for any reason, the prime-mover 3 overshoots, and the desired pair of receivers 9 is no longer aligned correctly with the pair of transmitters 6, the indicator 12 comprising the amber light and "slow-down" warning buzzer is automatically reactivated until a pair of receivers 9 is aligned with the pair of transmitters 6.

Following an operation of the kind described above, the indicator lights 12, 13 may be switched back to their original starting positions, by simply pressing a reset button 14, mounted on the display panel 11.

A display panel control circuit 15 for use with an alignment system according to the present invention is shown in Figure 3. The control circuit 15 is operated by means of a battery 16 provided in the prime-mover 3, for example a 12V battery, and the control circuit 15 is

switched on and off by means of a control switch 17 on the display panel 11.

Referring to Figures 3 and 4, an example of a complete operating cycle of the control circuit 15 in which there are four pairs of receivers 9 mounted on the chassis 4 at distances of 3.05m, 6.1m, 6.86m and 10m from the front X of the chassis 4 respectively, will now be described.

The control circuit 15 shown in Figure 3 is supplied by a 12V battery 16 in the prime-mover 3 and is divided into eight branches 18, 19, 20, 21, 22, 23, 24, and 25, which branches are arranged in parallel.

The first branch 18 of the control circuit 15 comprises a switching means or relay 18a, a diode 18b, as well as a light emitting diode or amber indicator light 12a and a slow-down warning buzzer 12b. The amber indicator light 12a and slow-down warning buzzer 12b together comprise the indicator 12 on the display panel 11. In addition, this "slow-down warning" branch 18 of the control circuit 15 comprises four normally closed relay contacts 26, 27, 28 and 29, two normally open relay contacts 30 and 31 and one normally open timer contact 32. The two normally open relay contacts 30 and 31 and the normally open timer contact 32 are arranged in parallel with one another and the normally closed relay contacts 26, 27, 28 and 29 arranged in series with one another. The normally open contacts 30, 31 and 32 are arranged in series with the normally closed contacts 26, 27, 28 and 29. Each of the normally closed relay contacts 26, 27, 28 and 29 is associated with a respective branch 20, 21, 22 or 23 (ie. the third, fourth, fifth or sixth branch) of the control circuit 15, each of which branches 20, 21, 22 and 23, in

turn, includes a respective pair of receivers 9 mounted on the chassis 4.

The second branch 19 of the control circuit 15 is connected to the pair of receivers 8 on the prime-mover 3 and comprises a relay 19a and a diode 19b.

The third branch 20 of the control circuit 15 is connected to the pair of transmitters 9 nearest the front X of the chassis 4 (ie. 3.05m from the front X of the chassis 4, as shown in Figure 2) and comprises a relay 20a, a diode 20b and a light emitting diode or red indicator light 13.

The fourth, fifth and sixth branches 21, 22 and 23 of the control circuit 15 are connected to the pairs of receivers 9 positioned at distances of 6.1m, 6.86m and 10m from the front X of the chassis 4, respectively. Each branch 21, 22 and 23 of the control circuit 15 also comprises a relay, 21a, 22a and 23a, respectively, a diode 21b, 22b and 23b, respectively, and a light emitting diode or red indicator light 13, respectively.

The seventh branch 24 of the control circuit 15 comprises a relay 24a, a diode 24b and a timer 24c. This "timer" branch 24 of the control circuit 15 also comprises two normally closed relay contacts 33 and 34 and four normally open relay contacts 35, 36, 37 and 38. The normally open relay contacts 35, 36, 37 and 38 are arranged in parallel with one another and are, in turn, arranged in series with the normally closed relay contacts 33 and 34. Each of the normally open relay contacts 35, 36, 37 and 38 is associated with a respective branch 20, 21, 22 or 23 (ie. the third, fourth, fifth or sixth branch) of the control circuit 15, each of which branches 20, 21, 22 and

23, in turn, includes a respective pair of receivers 9 mounted on the chassis 4.

The eighth branch 25 of the control circuit 15 comprises a dust sensor 39 mounted on the chassis 4 and a light emitting diode or green indicator light 40 mounted on the display panel 11. Activation of the green indicator light 40 indicates that one or more of the pairs of receivers 9 require servicing and the green indicator light 40 may be activated in response to a signal received from the dust sensor 39.

When a signal is received by the pair of receivers 8 on the prime-mover 3 (step A in Figure 4), relay 19a associated with the branch 19 of the control circuit 15 connected to the pair of receivers 8 on the prime-mover 3 is activated and the first normally open relay contact 30 in the "slow-down warning" branch 18 of the control circuit 15 is closed. Closing of the normally open relay contact 30 energises the "slow-down warning" branch 18 of the control circuit 15. A second normally open relay contact 31 in the "slow-down warning" branch 18 of the control circuit 15 is also closed at this point, and this latches the relay 18a associated with the "slow-down warning" branch 18 into an energised state. The indicator 12 comprising the amber light 12a and slow-down warning buzzer 12b is, therefore, also activated and because the relay 18a has been latched into an energised state by the closing of the second normally open relay contact 31, the indicator 12 will remain activated even when the signal to the pair of receivers 8 on the prime-mover 3 has been removed and the relay 19a in the branch 19 of the control circuit 15 connected to the pair of receivers 8 has been de-energised. Thus, the indicator 12 remains activated as the prime-mover 3 moves slowly to align the first pair of receivers 9 on

the chassis 4 with the pair of receivers 6 on the crane 7 (steps A to B in Figure 4).

When the first pair of receivers 9, which are positioned nearest to the front X of the chassis 4, receives a signal, the relay 20a associated with the branch 20 of the control circuit 15 connected to this first pair of receivers 9 is activated and this, in turn, activates the corresponding light emitting diode or red indicator light 13. A first normally closed contact 26 in the "slow-down warning" branch 18 of the control circuit 15 is opened and this has the effect of de-activating the latched relay 18a of the "slow-down warning" branch 18, thereby de-activating the indicator 12 comprising the amber indicator light 12a and slow-down warning buzzer 12b. The normally open relay contacts 30 and 31, which were closed when the pair of transmitters 8 on the prime-mover 3 received a signal, are now reopened. Thus, as soon as the pair of receivers 9 nearest the front X of the chassis 4 receives a signal from the pair of transmitters 6 on the crane 7, the indicator 12 comprising the amber indicator light 12a and slow-down warning buzzer 12b is automatically deactivated and the corresponding red indicator light 13 is automatically activated. At this point, the crane 7 is able to handle the container(s) 2, positioned between the receivers of the pair of receivers 9 which received the signal.

A signal received by the pair of receivers 9 nearest the front X of the chassis 4 also closes a first normally open relay contact 35 in the "timer" branch 24 of the control circuit 15. This energises the "timer" branch 24 and activates the "timer" relay 24a and the timer 24c. As soon as the prime-mover 3 begins to move the chassis 4 so as to align the next (ie. the second) pair of receivers

9 with the pair of transmitters 6 on the crane 7 (step C in Figure 4), the pair of receivers 9 nearest the front X of the chassis 4 will no longer receive a signal. The relay 20a in the branch 20 of the control circuit 15 connected to the pair of receivers 9 nearest the front X of the chassis 4 is consequently de-energised and the red indicator light 13, will be deactivated. The normally closed relay contact 26 in the "slow-down warning" branch 18 of the control circuit 15, which was opened when the pair of receivers 9 nearest the front X of the chassis 4 received a signal, is closed again, but the "slow-down warning" branch 18 of the control circuit 15 is not yet energised because all three normally open contacts 30, 31 and 32 are still open.

At this point the timer 24c in the "timer" branch 24 of the control circuit 15 is set so as to close the timer contact 32 in the "slow-down warning" branch 18 of the control circuit 15 a selected period of time (five seconds in the example shown in Figure 3) after de-energisation of the branch 20 of the control circuit 15 connected to the pair of receivers 9 nearest the front X of the chassis 4. Closing of this normally open timer contact 32 in the "slow-down warning" branch 18 of the control circuit 15 reactivates the relay 18a in the "slow-down warning" branch 18 of the control circuit 15, so that the indicator 12 comprising the amber indicator light 12a and slow-down warning buzzer 12b is also reactivated, 5 seconds after the pair of receivers 9 closest to the front X of the chassis 4 no longer receives a signal. The indicator 12 remains activated until the second pair of receivers 9 (positioned at a distance of 6.1m from the front X of the chassis 4) receives a signal from the pair of transmitters 6 on the crane 7 (Step D in Figure 4).

The cycle then continues in the same way as described previously, except that the branch 21 of the control circuit 15 connected to the second pair of receivers 9 is involved instead of the branch 20 connected to the first pair of receivers 9. Thus, when a signal is received by the second pair of receivers 9, the relay 21a of the branch 21 of the control circuit 15 connected to the second pair of receivers 9 is activated, as is the corresponding red indicator light 13. At the same time, a second normally closed contact 27 in the "slow-down warning" branch 18 of the control circuit 15 is opened and the "slow-down warning" branch 18 of the control circuit 15 and the indicator 12 comprising the amber indicator light 12a and slow-down warning buzzer 12b are consequently deactivated. The timer contact 32 in the "slow-down warning" branch 18 of the control circuit 15 is reopened. At this point the crane 7 is able to handle the container(s) 2 positioned between the receivers of the pair of receivers 9 positioned 6.1m away from the point X of the chassis 4.

A signal received by the second pair of receivers 9 also opens a second relay contact 36 in the "timer" branch 24 of the control circuit 15, thereby energising the "timer" branch 24, and activating the "timer" relay 24a and the timer 24c. As soon as the second pair of receivers 9 no longer receives a signal from the pair of transmitters 6 on the crane 7, the relay 21a and the red indicator light 13 in the branch 21 of the control circuit 15 connected to the second pair of receivers 9 are deactivated, the second normally closed relay contact 27 in the "slow-down warning branch" 18 is closed again and the timer 24c in the "timer" branch 24 is set for five seconds, after which the timer contact 32 in the "slow-down warning" branch 18 of the control circuit 15 is closed, thereby re-energising the

"slow-down warning" branch 18 and reactivating the indicator 12 comprising the amber indicator light 12a and slow-down warning buzzer 12b.

The cycle continues in this way as each consecutive pair of receivers 9 receives a signal from the pair of transmitters 6 on the crane 7, until the operation cycle is complete and all the plurality of containers 2 on the chassis 4 have been handled. Each pair of receivers 9 on the chassis 4 is connected to a different branch 20, 21, 22 or 23 of the control circuit 15 and each time a branch 20, 21, 22 or 23 of the control circuit 15 is energised due to a signal received by a pair of receivers 9 on the chassis 4, a corresponding red indicator light 13 is activated and a corresponding relay 26, 27, 28 or 29 in the "slow-down warning" branch 18 of the control circuit 15 is opened, so as to deactivate the indicator 12 comprising the amber indicator light 12a and slow-down warning buzzer 12b. At this point the crane 7 is able to handle the container(s) 2, positioned between the receivers of the pair of receivers 9 that received the signal. Furthermore, a corresponding timer contact 35, 36, 37 or 38 in the "timer" branch 24 of the control circuit 15 is also closed so as to activate the timer 24c and thereby reactivate the slow-down warning indicator 12 a set period of time (5 seconds) after the pair of receivers 9 no longer receives a signal and the red indicator light in the branch 20, 21, 22 or 23 of the control circuit 15 connected to the pair of receivers 9 has been deactivated.

The branch 23 of the control circuit 15 connected to the last pair of receivers 9 on the chassis 4 (ie. the pair of receivers 10m away from the front X of the chassis 4) is also used to terminate the "timer" branch 24 and the

"slow-down warning" branch 18 of the control circuit 15 until a new operation cycle starts again.

The period of time for which the timer 24c is set is based on the distance between each pair of receivers 9 and the front X of the chassis 4.

If, at any time, the operating cycle of the alignment system is terminated prematurely, or if the pair of receivers 9 furthest away from the front X of the chassis 4 is not activated, then the reset button 14 on the display panel 11 may be depressed. This interrupts the 12V battery supply to the control circuit 15 and resets all of the relays 18a, 19a, 20a, 21a, 22a, 23a and 24a to their original starting positions.

The driver of the prime-mover 3 is, thus, able to align the plurality of containers 2 on the chassis 4 quickly and efficiently with respect to the crane 7, without relying on hand signals from fellow workers, so that the crane 7 is then able to carry out handling of the plurality of containers 2.

Typical performances of the above-described alignment system are within ± 15 centimetres at a sensing distance of 25 metres. The performance of the alignment system is also typically within $\pm 15^\circ$ out of parallelism.

CLAIMS

1. An alignment system for use in aligning a first object with a second object, which system comprises a transmitter, for transmitting a directable signal in the form of a non-overlapping beam, the transmitter being mounted on either the first object or the second object, a receiver for receiving the signal, mounted on the other of the first object or the second object, and an indicator for indicating that a signal from the transmitter has been received by the receiver, wherein the first object comprises a chassis for holding container(s) and a prime mover for moving the chassis and the second object comprises container-handling equipment.
2. An alignment system according to Claim 1, wherein the directable signal comprises a through-beam infra-red signal.
3. An alignment system according to Claim 1 or 2, wherein the first object is movable and the second object is stationary.
4. An alignment system according to Claim 3, wherein the transmitter is configured to transmit the signal in a direction which is substantially perpendicular to the direction of movement of the first object.
5. An alignment system according to any one of Claims 1 to 4 wherein the container-handling equipment comprises a crane.
6. An alignment system according to any one of Claims 1 to 5, wherein at least one transmitter is mounted on the container-handling equipment and at least one receiver is mounted on the prime-mover or the chassis in substantially



the same horizontal plane as the transmitter on the container-handling equipment.

7. An alignment system according to Claim 6, wherein at least one receiver is mounted on the other of the prime-mover or the chassis in substantially the same horizontal plane as the transmitter on the container-handling equipment.

8. An alignment system according to Claim 7 comprising a plurality of receivers on the chassis, mounted at intervals along the chassis at positions corresponding to positions midway along the lengths of containers supportable by the chassis.

9. An alignment system according to any of Claims 6, 7, or 8, wherein the at least one transmitter comprises a pair of opposed transmitters, each transmitter of the pair of opposed transmitters being mounted on either side of the container-handling equipment and wherein the at least one receiver comprises a pair of opposed receivers, each receiver of a pair of opposed receivers being mounted on either side of the prime-mover and/or chassis.

10. An alignment system according to Claim 9, wherein a single pair of opposed transmitters is mounted on the container-handling equipment, a single pair of opposed receivers is mounted on the prime-mover and a plurality of opposed receivers are mounted on the chassis.

11. An alignment system according to Claim 10, wherein each of the transmitters of the pair of opposed transmitters are inwardly directed and each receiver of the pairs of opposed receivers are outwardly directed, the prime-mover and chassis with the outwardly directed



receivers being movable in use, between the inwardly directed transmitters of the container-handling equipment.

12. An alignment system according to any of Claims 7 to 11, comprising a plurality of indicators, each indicator being responsive to at least one receiver.

13. An alignment system according to Claim 12, wherein each indicator is responsive to a single receiver or pair of opposed receivers.

14. An alignment system according to any one of Claims 1 to 13, wherein each indicator is mountable on a display panel.

15. An alignment system according to Claim 14, wherein the display panel is mountable in the prime-mover.

16. An alignment system according to any one of Claims 1 to 15, wherein an indicator comprises a light, bell and/or buzzer.

17. An alignment system according to any one of Claims 1 to 16 wherein at least one indicator and at least one receiver form part of a control circuit.

18. An alignment system according to Claim 17, wherein, the control circuit is provided with a plurality of branches and the at least one indicator is associated with at least one branch of the control circuit, the at least one branch of the control circuit being connected to the at least one receiver.



19. An alignment system according to Claim 18, wherein the at least one receiver connected to the at least one branch of the control circuit is mounted on the chassis.
20. An alignment system according to Claim 19, wherein the at least one indicator associated with the at least one branch of the control circuit connected to the at least one receiver on the chassis is activated when the at least one receiver on the chassis receives a signal.
21. An alignment system according to Claim 20, wherein at least one further indicator is associated with at least one further branch of the control circuit, the at least one further branch of the control circuit being connected to at least one further receiver mounted on the prime-mover.
22. An alignment system according to Claim 21, wherein the at least one further indicator is activated when the at least one further receiver on the prime-mover receives a signal, is deactivated when the at least one receiver on the chassis receives a signal and is, thereafter, reactivated a set period of time after the at least one receiver on the chassis no longer receives a signal.
23. An alignment system according to Claim 22, wherein the set period of time is five seconds.
24. An alignment system according to any one of Claims 1 to 16, including a control circuit which comprises a first branch having a switching means, an indicator, a normally open timer contact, at least one normally opened switching means contact and at least one normally closed switching means contact, a second branch having a switching means and at least one receiver, a third branch having a switching means, a timer and at least one normally open



switching means contact and at least one fourth branch having a switching means, an indicator and at least one receiver.

25. An alignment system according to Claim 24, wherein the at least one receiver of the second branch of the control circuit is mounted on the prime-mover.

26. An alignment system according to Claim 24 or 25, wherein the at least one receiver of the at least one fourth branch of the control circuit is mounted on the chassis.

27. An alignment system according to any one of Claims 24 to 26, wherein the switching means of the second branch of the control circuit is operable in response to a signal received by the at least one receiver of the second branch to close the at least one normally open switching means contact in the first branch of the control circuit, thereby activating the first branch of the control circuit and the corresponding indicator.

28. An alignment system according to any one of Claims 24 to 27, wherein the switching means of the at least one fourth branch of the control circuit is operable, in response to a signal received by the at least one receiver of the at least one fourth branch to open the at least one normally closed switching means contact in the first branch of the control circuit, thereby deactivating the first branch of the control circuit and the corresponding indicator, and to close a normally open switching means contact in the third branch of the control circuit, thereby activating the third branch of the control circuit and the corresponding timer.



29. An alignment system according to Claim 28, wherein the timer is set for a selected period of time and wherein the normally open timer contact in the first branch of the control circuit is closed the selected period of time after the at least one receiver in the at least one fourth branch of the control circuit no longer receives a signal, thereby deactivating the first branch of the control circuit and the corresponding indicator.

30. An alignment system according to Claim 29, wherein the selected period of time is based on the distance between the at least one receiver in the at least one fourth branch and the front of the chassis.

31. An alignment system according to Claim 30, wherein the selected period of time is five seconds.

32. An alignment system according to any one of Claims 24 to 31, further comprising a fifth branch having a dust sensor and an indicator, and wherein the indicator is activated in response to a signal receivable from the dust sensor.

33. An alignment system for use in aligning a first object with a second object, which alignment system comprises a control circuit for controlling alignment of the first object with the second object, the control circuit comprising (a) at least one receiver, mounted on either the first object or the second object and adapted to receive a signal in the form of a non-overlapping beam from a transmitter mounted on the other of the first object or second object, (b) at least one indicator, and (c) means for activating the at least one indicator in response to a signal in the form of a non-overlapping beam being received from the transmitter, in use, by the at least one receiver,



wherein the first object comprises a chassis for holding container(s) and a prime mover for moving the chassis and the second object comprises container-handling equipment.

34. An alignment system according to Claim 33, wherein the control circuit comprises a first receiver, a first indicator responsive to the first receiver, at least one second receiver, at least one second indicator responsive to the at least one second receiver, means for deactivating the first indicator in response to a signal received, in use, by the at least one second receiver and means for reactivating the first indicator a set period of time after the at least one second receiver, in use, no longer receives the signal.

35. A method of aligning a first object with a second object using a system according to any one of Claims 1 to 23, which method comprises moving the first object with respect to the second object until a receiver is aligned with and receives a signal from a transmitter, as indicated by an indicator.

36. A method according to Claim 35, wherein, when a receiver or pair of receivers on the prime-mover is aligned with a transmitter or pair of transmitters on the container-handling equipment, the receiver activates an indicator for indicating that the movement of the prime-mover is to be slowed.

37. A method according to Claim 35 or 36, wherein, when a receiver or pair of receivers on the chassis is aligned with a transmitter or pair of transmitters on the container-handling equipment, the receiver activates an indicator for indicating that movement of the prime-mover is to be stopped.



38. A method of aligning a first object with a second object, which method comprises moving the first object with respect to the second object until a receiver, mounted on the first object or second object, is aligned with and receives a signal in the form of a non-overlapping beam from a transmitter mounted on the other of the first object or second object, as indicated by an indicator, wherein the first object comprises a chassis for holding containers and a prime mover for moving the chassis and the second object comprises container-handling equipment.

39. A method according to Claim 38, comprising the steps of moving the first object with respect to the second object until a first receiver mounted on the prime-mover is aligned with and receives the signal from the transmitter, indicating with the indicator the alignment of the first receiver with the transmitter, slowing the first object when the alignment of the first receiver with the transmitter is indicated, moving the first object with respect to the second object until a second receiver mounted on the chassis is aligned with and receives the signal from the transmitter, indicating with the indicator the alignment of the second receiver with the transmitter and stopping the first object when the alignment of the second receiver with transmitter is indicated.

40. An alignment system, substantially as hereinbefore described, with reference to, and as shown in Figures 1 to 4 of the accompanying drawings.

41. A method of aligning a first object with a second object, substantially as hereinbefore described with reference to Figures 1 to 4 of the accompanying drawings.

