[CLAIMS]

[Claim 1]

A container position detection apparatus detecting a position which a holding container should be arranged in a container yard, the container position detection apparatus comprising:

a detection light irradiation unit which radiates detection light from above so as to traverse a side surface of the holding container and an upper edge of a stacked container previously arranged in the container yard, in a first direction intersecting with the side surface;

a first imaging unit spaced apart from the detection light irradiation unit in a second direction horizontal along the side surface of the holding container and capturing an irradiation range of the detection light obliquely from above to detect a first detection light radiated to the holding container and a second detection light radiated to an upper surface of the stacked container; and

a container position determination unit which finds a container arrangement position based on the first detection light and the second detection light,

wherein the container position determination unit finds a vertical distance between a lower end of the holding container and the upper edge of the stacked container based on a deviation amount in the second direction between a position of the first detection light and a position of the second detection light which are detected by the first imaging unit.

[Claim 2]

The container position detection apparatus according to claim 1, wherein the container position determination unit finds a height of the upper edge of the stacked container based on a position of the second detection light detected by the first imaging unit.

[Claim 3]

The container position detection apparatus according to claim 1 or 2, further comprising a second imaging unit which captures the container yard to detect a mark corresponding to a container arrangement position provided in the container yard,

wherein the container position determination unit finds the container arrangement position in the container yard based on a position of the mark.

[Claim 4]

The container position detection apparatus according to claim 3, wherein the first imaging unit is used as the second imaging unit.

[Claim 5]

The container position detection apparatus according to claim 3 or 4, further comprising an illumination unit which illuminates an imaging range of the second imaging unit.

[Claim 6]

The container position detection apparatus according to claim 5, wherein a wavelength band of each of the detection light and illumination light illuminated by the illumination unit is set to an atmospheric absorption band.

[Claim 7]

The container position detection apparatus according to any one of claims 1 to 6, wherein:

the detection light irradiation unit radiates the detection light so as to traverse an upper edge of a preinstalled adjacent container which is previously arranged so as to be adjacent to the container arrangement position; and

the container position determination unit detects a position of the preinstalled adjacent container.

[Claim 8]

A crane control system comprising:

a crane which moves a container in a container yard;

the container position detection apparatus according to any one of claims 1 to 7; and

a control apparatus which controls the crane based on the container arrangement position found by the container position detection apparatus.