CLAIMS

1. A detection device, comprising:

a detection assembly comprising at least two rows of detection units, wherein the row of the detection units are arranged along a first direction in a field of view on a surface of a to-be-detected object, and each row of detection units comprises at least two detection units, the detection units in one row are arranged along a second direction in the field of view on the surface of the to-be-detected object, and each of the detection units is configured to detect the to-be-detected object, where the second direction is perpendicular to the first direction; and

a driving assembly configured to drive the to-be-detected object to move along at least one of the first direction and the second direction, or drive the detection assembly as a whole to move along at least one of the first direction and the second direction,

wherein the driving assembly comprises a first driving component configured to drive the to-be-detected object to move along the first direction and the second direction with respect to the detection units, wherein

the first driving component, during operation, drives the to-be-detected object to reciprocate along the first direction, wherein a travel distance of one way in reciprocating is greater than or equal to one row spacing, and the row spacing indicates a distance between adjacent rows; and

every time before the to-be-detected object is driven to change direction, the first driving component drives the to-be-detected object to move along the second direction with a predetermined distance, where the predetermined distance is greater than or equal to an interval between adjacent detection units along the second direction.

2. The detection device according to claim 1, wherein each of the detection units comprises an optical path assembly and a detection component, wherein

the optical path assembly is configured to direct light emitted from a light source to a detection area on the surface of the to-be-detected object, and direct signal light formed by the detection area to the detection component;

the detection component is configured to detect the detection area based on the signal light; and

in a detection process, scanning ranges of the detection units are at least partially non-overlapping.

3. The detection device according to claim 2, wherein light exit ports of optical path components of the detection unit are arranged on a same side of the surface of the to-be-detected object, and are arranged in a plurality of rows along the first direction, wherein each of the rows comprises at least two light exit ports arranged at an interval, and the signal light reflected by the detection area passes through light exit ports and enters the detection component.

4. The detection device according to claim 2, wherein

fields of view of optical path assemblies in adjacent rows are spaced by a same distance of L/N, and a number of the fields of view in each of the rows is M, and

the fields of view of optical path assemblies in one row are spaced by a distance of S/M,

wherein L represents a maximum dimension of the surface of the to-be-detected object along the first direction, and S represents a maximum dimension of the surface of the to-be-detected object along the second direction, and N is a natural number representing a number of the rows.

5. The detection device according to claim 2, wherein each of the detection components comprises a tube lens and a detector, wherein the tube lens is configured to direct the signal light to the detector; and

wherein optical axes of the detection components are parallel to the surface of the to-be-detected object, and the optical axes of the detection components are in a same horizontal plane; or

optical axes of a part of the detection components are parallel to the surface of the to-be-detected object and the optical axes of the part of the detection components are in a same horizontal plane, and optical axis of other part of the detection components are perpendicular to the surface of the to-be-detected object.

6. The detection device according to claim 2, wherein each of the optical path assemblies is connected to the light source through an optical fiber, wherein

an optical axis of the optical path assembly is perpendicular to the surface of the

to-be-detected object;

the optical path assembly comprises: a beam splitter and an objective lens, wherein the beam splitter is configured to transmit light emitted from the light source to the objective lens, and the objective lens is configured to collect the signal light returned by the surface of the to-be-detected object, and transmit the signal light to the beam splitter, wherein the beam splitter is further configured to reflect the signal light collected by the objective lens to the detection component.

7. The detection device according to claim 6, wherein the optical path component further comprises:

a collimating assembly connected with the light source, wherein the collimating assembly is configured to collimate the light emitted from the light source, and the light collimated by the collimating assembly is received by the beam splitter; and

a filter assembly arranged on an optical path between the light source and the objective lens, wherein the filter assembly comprises one or more diaphragms.

8. The detection device according to claim 2, wherein each of the optical path assemblies is connected to the light source through an optical fiber, and comprises a beam splitter and an objective lens, wherein

an optical axis of the optical path assembly between the light source and the beam splitter is parallel to the surface of the to-be-detected object;

the beam splitter is configured to reflect the light emitted from the light source to the objective lens, and

the objective lens is configured to collect the signal light returned from the surface of the to-be-detected object, and transmit the signal light to the beam splitter,

the detection component comprises a first detection component and a second detection component,

the second detection component has an optical axis perpendicular to the surface of the to-be-detected object, and the first detection component includes a reflector,

the beam splitter is further configured to transmit the signal light collected by the objective lens to the second detection component, or to transmit the signal light collected by

the objective lens to the reflector, and

the reflector is configured to reflect the signal light transmitted through the beam splitter to rotate a propagation direction of the signal light by 90° and direct the reflected signal light to the first detection component.

9. The detection device according to claim 8, wherein the field of view of the first detection component is spaced from the field of view of the second detection component.

10. The detection device according to claim 6, wherein

the device further comprises at least one of:

an autofocus module fixedly arranged on each of the detection components, wherein the autofocus module is configured to operate to make the detection unit focus on the to-be-detected object, and the autofocus module comprises one or both of a WDI module and a spectral confocal module; or

a low-power imaging assembly, wherein an optical axis of a lens of the low-power imaging assembly is arranged at a center of an area enclosed by light exit ports of the optical path assemblies,

wherein each of the detection components comprises a camera, a zoom motor, and an imaging zoom lens barrel, wherein the zoom motor is configured to drive the imaging zoom lens barrel to move along an axial direction of the imaging zoom lens barrel to achieve zooming of the camera; and/or

each of the optical path assemblies comprises a light incident end connected to an optical fiber, and the optical path assembly is further provided with at least one diaphragm, the beam splitter and the objective lens, wherein the optical axis of the light incident end is perpendicular to the surface of the to-be-detected object or is parallel to the surface of the to-be-detected object.

11. The detection device according to claim 6, wherein the objective lens of the optical path assembly has an aperture size in a range from 10mm to 150mm, and the objective lens has a numerical aperture in a range from 0.1 to 0.95.

12. The detection device according to claim 1, further comprising: a rack, wherein the detection units are integrated on the rack.

13. A detection method, comprising:

arranging at least two rows of detection units in advance, wherein the rows of detection units are arranged along a first direction in a field of view on a surface of a to-be-detected object, the detection units in one row are arranged along a second direction in the field of view on the surface of the to-be-detected object, each row of detection units comprises at least two detection units, and the second direction is perpendicular to the first direction; and

driving the to-be-detected object to move along at least one of the first direction and the second direction, or driving the detection units as a whole to move along at least one of the first direction and the second direction, to detect the surface of the to-be-detected object,

wherein the driving the to-be-detected object comprises:

driving the surface of the to-be-detected object to move along the first direction and the second direction with respect to the detection units;

driving, during operation, the to-be-detected object to reciprocate along the first direction, wherein a travel distance of one way in reciprocating is greater than or equal to one row spacing, and the row spacing indicates a distance between adjacent rows; and

driving, every time before the to-be-detected object is driven to change direction, the to-be-detected object to move along the second direction with a predetermined distance, wherein the predetermined distance is greater than or equal to an interval between adjacent detection units along the second direction.

14. A detection apparatus, comprising:

an installation body, wherein the installation body is provided with at least two detection devices according to any one of claims 1 to 12, wherein

each of the detection devices comprises a positioning device and the at least two rows of detection units, wherein the positioning device is configured to support the to-be-detected object, and the detection units are configured to transmit light with a predetermined wavelength to a to-be-detected surface of the to-be-detected object supported by a corresponding positioning device, to detect the to-be-detected surface, wherein predetermined wavelengths of lights transmitted through different detection devices have at least partially non-overlapping ranges.

15. The detection apparatus according to claim 14, wherein light incident ends of all optical path components of one detection device are connected to at least one light source with a same wavelength range.

16. The detection apparatus according to claim 15, wherein the light source connected to the optical path assemblies of at least one of the detection devices is a single-wavelength light source; and the light source connected to the optical path assemblies of at least one of the detection devices is a broad-spectrum light source.

17. The detection apparatus according to claim 14, further comprising:

a transport device configured to convey the to-be-detected object between positioning devices.

18. The detection apparatus according to claim 17, further comprising: a plurality of accommodating chambers and a plurality of transport chambers, wherein

the detection devices are arranged within respective accommodating chambers, and each of the accommodating chambers is communicated with at least one of the transport chambers through a transport window; and

the transport device is arranged within the transport chambers, and is configured to convey the to-be-detected object between adjacent accommodating chambers by means of the transport window.