

DESCRIPTION

[Title of Invention] STOCKER AND METHOD FOR FORMING WORK
PLATFORM

Technical Field

[0001]

The present invention relates to a stocker and a
method for forming a work platform.

Background Art

[0002]

In semiconductor manufacturing factories and the
like, a stocker is installed in order to store containers
(articles) such as FOUPs accommodating semiconductor wafers
or reticles and reticle pods. Such a stocker includes
racks for placing articles thereon within the stocker and a
transporter which travels within the stocker to transfer
the articles. The racks are arranged in multiple stages in
a vertical direction along a traveling space of the
transporter. Formation of a work platform in such a
stocker is known such that a plurality of platform members
are arranged in the traveling space of the transporter in
order to allow a worker to access upper racks at the time
of trouble while accommodating articles or at the time of
performing maintenance (for example, see Patent Literature
1).

Citation List

Patent Literature

[0003]

[Patent Literature 1] Japanese Unexamined Patent
Application, First Publication No. 2008-019031

Summary of Invention

Technical Problem

[0004]

In the stocker of Patent Literature 1, a plurality of platform members are sequentially fed along a pair of rails flanking a traveling space and extending in parallel in the horizontal direction from a housing provided on the outside of a door which separates inside and outside of the stocker, to thereby form a work platform. A worker feeds the platform members onto the rails from the housing in the formation of such a work platform. However, the operation of feeding the leading platform member onto the rails is troublesome, and the burden on the worker is significant due to the operation having to be performed at a high place. Also, when the worker opens the door which separates the inside and the outside of the stocker while the work platform has not been formed, entry to the inside of the stocker is not restricted. Therefore, care must be taken as to opening and closing the door, and this places a burden on the worker.

[0005]

In view of the above circumstances, an object of the present invention is to provide a stocker and a method for forming a work platform capable of easy formation of a work platform to reduce the burden on a worker.

Means for Solving Problem

[0006]

A stocker according to the present invention comprises: a transporter which travels through a traveling space within a stocker and transports an article; a pair of rails which flank the traveling space and extend in parallel in a horizontal direction; a plurality of platform members movable along the pair of rails; and a housing which is provided on a stocker outer side of a door which separates inside and outside of the stocker, and which

houses the plurality of platform members; wherein the pair of rails are arranged so as to extend from the inside of the stocker to the housing through an opening provided directly under the door, at least one of the plurality of platform members includes a fence in an upright standing manner and an upper end of the fence is higher than an upper end of the opening, and the platform member which includes the fence is arranged across the inside of the stocker and the outside of the stocker via the opening while the fence is arranged on a stocker inner side.

[0007]

The fence may be provided on the platform member which is firstly fed onto the pair of rails. The fence may include a plurality of struts which extend upward from the platform member, and a plurality of horizontal parts arranged between the plurality of struts, and the horizontal part arranged topmost may be set higher than a position of the waist of a worker standing on the platform member. The platform members other than the platform member which includes the fence among the plurality of platform members may be housed within the housing in a state of being stacked when the transporter travels.

[0008]

The transporter may include: a traveler which travels through the traveling space; a mast which is provided in a vertical direction from the traveler, an outer circumferential part of the mast being of an arc shape in plan view; and a transfer unit which is raised or lowered along the mast. In the platform member which is closest to the mast among the plurality of platform members there may be provided a cutout into which a part of the mast enters.

[0009]

A method for forming a work platform according to the present invention is a method for forming a work platform in a stocker including a transporter which travels through a traveling space within a stocker and transports an article, the stocker including: a pair of rails which flank the traveling space and extend in parallel in a horizontal direction; a plurality of platform members movable along the pair of rails; and a housing which is provided on a stocker outer side of a door which separates inside and outside of the stocker, and which houses the plurality of platform members; and the pair of rails are arranged so as to extend from the inside of the stocker to the housing through an opening provided directly under the door; at least one of the plurality of platform members includes a fence in an upright standing manner and an upper end of the fence is higher than an upper end of the opening; the method comprising: housing the platform members other than the platform member which includes the fence among the plurality of platform members within the housing in a state of being stacked when the transporter travels, arranging across the inside of the stocker and the outside of the stocker via the opening the platform member which includes the fence while arranging the fence on an inner side of the stocker; and feeding, after the platform member which includes the fence, the platform members sequentially onto the pair of rails within the stocker through the opening from the housing when the transporter stops.

Advantageous Effects of the Invention

[0010]

According to a stocker and a method for forming a work platform of the present invention, the platform member which includes the fence is arranged across the inside of

the stocker and the outside of the stocker via the opening while the fence is arranged on a stocker inner side. Therefore, the worker can easily and simply form a work platform by feeding, after the platform member which includes the fence, the other platform members from the housing sequentially onto the rails, thereby reducing the burden on the worker. When the worker opens the door of the stocker while the work platform has not been formed, the fence is standing upright close to the stocker inner side with respect to the door. Therefore, entry of the worker into the stocker through the door can be restricted.

[0011]

In a case where the fence is provided on the platform member which is firstly fed onto the pair of rails, it is possible to easily form a work platform which includes the fence at a leading position thereof, and when the platform members are not in use, the fence can be positioned near the inner side of the door. In a case where the fence includes a plurality of struts which extend upward from the platform member and a plurality of horizontal parts arranged between the plurality of struts, and the horizontal part arranged topmost is set higher than a position of the waist of a worker standing on the platform member, rigidity of the fence can be improved by the plurality of struts and the plurality of horizontal parts. Also, since the horizontal part arranged topmost is higher than the position of the waist of a worker, the topmost horizontal part can function as an effective fence for the worker. In a case where the platform members other than the platform member having the fence provided thereon among the plurality of platform members are housed within the housing in a state of being stacked when the transporter

travels, the plurality of platform members can be efficiently stored in the housing.

[0012]

In a case where the transporter includes: a traveler which travels through the traveling space; a mast which is provided in a vertical direction from the traveler, an outer circumferential part of the mast being of an arc shape in plan view; and a transfer unit which is raised or lowered along the mast, articles can be transferred efficiently by the transporter. In a case where a cutout into which a part of the mast intrudes is provided in the platform member which is closest to the mast among the plurality of platform members, by having the part of the mast intruding into the cutout, the platform member can be arranged close to the mast, an outer circumferential part of which is of an arc shape. Accordingly, since the gap between the mast and the platform member is made small, fall of objects through the gap can be reduced.

Brief Description of the Drawings

[0013]

Fig. 1 is a plan view showing an example of a stocker according to an embodiment.

Fig. 2 is a front elevation view of the stocker shown in Fig. 1.

Fig. 3 is a perspective view showing a housing and a door.

Fig. 4 is a diagram of inside of the stocker as viewed from outside of the stocker with the door open.

Fig. 5 (A) is a side view showing a platform member. Fig. 5 (B) to Fig. 5 (D) are diagrams showing an operation of coupling members.

Fig. 6 is a flowchart showing a method for forming a

work platform according to the embodiment.

Fig. 7 (A) and Fig. 7 (B) are explanatory diagrams of the method for forming a work platform.

Fig. 8 (A) and Fig. 8 (B) are explanatory diagrams of the method for forming a work platform, following Fig. 7.

Fig. 9 is explanatory diagram of the method for forming a work platform, following Fig. 8.

Description of Embodiments

[0014]

The following describes an embodiment of the present invention with reference to the drawings. However, the present invention is not limited to the embodiment. In the drawings, scale is changed as necessary to illustrate the embodiment, such as by enlarging or by emphasizing a part. In the following drawings, an XYZ coordinate system is used to describe the directions in each drawing. In the XYZ coordinate system, a plane that is parallel to a horizontal plane is defined as an XY plane. In the XY plane, a traveling direction of a transporter 1 is denoted as an X direction and a direction orthogonal to the X direction in the horizontal direction is denoted as a Y direction. A direction perpendicular to the XY plane is denoted as a Z direction. For each of the X direction, the Y direction, and the Z direction, description is made with a definition in which a direction indicated by an arrow is the positive (+) direction and a direction opposite to the direction indicated by the arrow is the negative (-) direction.

[0015]

Embodiment

Fig. 1 and Fig. 2 are diagrams conceptually showing an example of a stocker according to an embodiment. Fig. 1 is a top view as viewed from the +Z side. Fig. 2 is a

front elevation view as viewed from the -Y side.

[0016]

A stocker S is installed, for example, in a semiconductor manufacturing factory and stores articles F, examples of which include a container such as a FOUP accommodating semiconductor wafers and a reticle pod accommodating a processing member such as a reticle. A transporter 1 of the present embodiment is a stacker crane. The stocker S has an internal space that can be isolated from the outside. The stocker S includes an incoming/outgoing port (not shown in the drawings) through which the articles F are transferred between the outside of the stocker S and the internal space. The stocker S includes the transporter 1, storage racks 2, a door 3, a pair of rails 4, platform members 5, and a housing 6.

[0017]

The storage racks 2 are arranged inside the stocker S and accommodate the articles F. A plurality of the storage racks 2 are provided. The storage racks 2 are arranged on both sides (+Y side and -Y side) of a direction (Y direction) intersecting with a moving direction (X direction) of the transporter 1. Each storage rack 2 includes a plurality of rack plates and vertical plates, and can accommodate a plurality of articles F.

[0018]

The transporter 1 travels through a traveling space SP within the stocker S and transports articles F. The traveling space SP is provided between the storage racks 2 on the +Y side and the -Y side. The transporter 1 includes travelers 8 (see Fig. 2), a mast 9, and a transfer unit 10.

[0019]

The traveler 8 of Fig. 2 travels along tracks 11 (not

shown in the drawings). The tracks 11 are provided in an upper part (not shown in the drawings) and a lower part within the stocker S, respectively. The upper and lower tracks 11 are both provided between the storage racks 2 on the +Y side and the -Y side. The upper and lower tracks 11 are each arranged in a direction parallel to the X direction. On the -X side of each of the upper and lower tracks 11, a stopper 12 is provided for restricting the traveling of the travelers 8. The stopper 12 restricts a travel range of the traveler 8. The traveler 8 has a traveling driver such as an electric motor, a speed reducer, a drive wheel, an encoder, and so forth. The drive wheel is arranged so as to be in contact with the track 11, and is connected to an output axis of the electric motor (the traveling driver) via the speed reducer. The rotation of the output axis of the electric motor is transmitted to the drive wheel via the speed reducer, and the rotation of the drive wheel drives the traveler 8 to travel. The traveling driver (the electric motor) may be a rotary type motor, and may be a linear motor.

[0020]

A mast 9 that extends in the vertical direction (in the perpendicular direction) is provided between the upper traveler 8 and the lower traveler 8. The mast 9 moves integrally with the upper traveler 8 and the lower traveler 8 (see Fig. 2). As shown in Fig. 1, the mast 9 is of a shape of a part of a circle when viewed from above (in plan view), and an outer circumferential part thereof is of an arc shape. The mast 9 is, when viewed from above, of a C-shape and includes a cutout 9a having a shape in which a part of a substantially semicircular shape is cut out. The

mast 9 is supported via a rotational supporter (not shown in the drawings) so as to be able to rotate about a predetermined rotation axis parallel to the direction perpendicular to the traveler 8, and is driven by a rotation driver such as an electric motor (not shown in the drawings) to rotate (see Fig. 1). When the mast 9 rotates, the trajectory of an arc-shaped outer circumference 9b of the mast 9 is a substantially circular trajectory as viewed from above. When transferring the article F, the mast 9 rotates so that the article F faces in the direction of a transfer destination. When transporting the article F to the storage rack 2 on the +Y side, the mast 9 rotates so that the article F faces the +Y side as shown by the solid lines in Fig. 1. Also, when transporting the article F to the storage rack 2 on the -Y side, the mast 9 rotates so that the article F faces the -Y side as shown by the dashed lines in Fig. 1.

[0021]

The transfer unit 10 transfers the article F to a predetermined position. The transfer unit 10 includes an elevation platform 14 and a transferer 15. The elevation platform 14 is arranged in the cutout 9a of the mast 9 (see Fig. 1). In a case where the elevation platform 14 is arranged in the cutout 9a of the mast 9, the transferer can be made in a compact size. The elevation platform 14 is raised or lowered along the mast 9 (see Fig. 2). The elevation platform 14 is guided by a guide 16 which is provided in the mast 9 and extends in the perpendicular direction. The elevation platform 14 is suspended from above by means of suspenders such as wires or the like. The transporter 1 includes a lift driver (not shown in the drawings) that drives the suspenders. The lift driver

feeds out or winds up these suspenders. When the lift driver winds up the suspenders, the elevation platform 14 is raised by being guided by the mast 9. Also, when the lift driver feeds out the suspenders, the elevation platform 14 is lowered by being guided by the mast 9.

[0022]

The transferer 15 transfers the article F. The transferer 15 is provided on the elevation platform 14. The transferer 15 is raised or lowered as the elevation platform 14 is raised or lowered (see Fig. 2). The transferer 15 includes an arm 18, a holder 19, and a rotation driver 20 (see Fig. 1). The arm 18 is a telescopic arm. The arm 18 is of a structure in which two arms are connected via a joint. The arm 18 can extend or retract in a horizontal direction as the arms bend at the joint. A proximal end side of the arm 18 is connected to the rotation driver 20. The holder 19 which positions and holds the article F is rotatably connected to a distal end side of the arm 18. When delivering the article F to the transfer destination as shown with the solid lines in Fig. 1, the transferer 15 extends the arm 18, and positions the article F held on the holder 19 above the transfer destination. Then, by lowering the elevation platform 14, the article F is delivered to the transfer destination from the holder 19. When the transferer 15 receives the article F from a transfer origin such as the storage rack 2, the arm 18 extends toward the article F placed at the transfer origin, and the holder 19 is positioned below the bottom surface of the article F. Then, in the transferer 15, the holder 19 picks up the article F as the elevation platform 14 is raised. Then, in the transferer 15, as shown with the dotted lines in Fig. 1, the arm 18 is retracted with

the article F being held on the holder 19, and the holder 19 holds the article F above the elevation platform 14.

[0023]

As described above, the transporter 1 includes the travelers 8 which travel through the traveling space SP, the mast 9 which is provided in the vertical direction from the travelers 8, and the outer circumferential part of which is of an arc shape in plan view, and the transfer unit 10 which is raised or lowered along the mast 9. Therefore, article F can be transferred efficiently by the transporter.

[0024]

In some cases, a worker U may perform maintenance work in the stocker S. When performing the maintenance work, the worker U accesses the inside of the stocker S from the door 3 which separates the inside of the stocker S and the outside of the stocker S. The maintenance work performed by the worker U may be performed at a high place in the stocker S in some cases. The maintenance work at a high place in the stocker S is performed upon installing a high-place work platform.

[0025]

As shown in Fig. 2, at each predetermined height, the stocker S of the present embodiment includes, to the vicinity of the topmost part of the stocker S, the door 3, a platform installer 22 which installs a work platform SC, and a floor surface 24. The platform installer 22 includes a pair of rails 4, platform members 5 (pallets), and a housing 6. The floor surface 24 provided at each height has a ladder (not shown in the drawings) provided thereon, and the worker U can move up or down to the floor 24 of each height using the ladder. As described above, since

the stocker S of the present embodiment enables installation of a platform at each predetermined height, maintenance work can be easily performed at each high place.

[0026]

The pair of rails 4 support and guide the platform members 5 as shown in Fig. 2. As shown in Fig. 1, the pair of rails 4 flank the traveling space SP and extend in parallel in the horizontal direction (in the X direction). The pair of rails 4 extend from the inside of the housing 6 described later to the +X side end of the stocker S. Such a configuration enables movement and installation of the platform member 5 between the inside of the housing 6 and the +X side end of the stocker S.

[0027]

Fig. 3 is a perspective view showing the housing and the door portion. As shown in Fig. 3, the pair of rails 4 are arranged so as to extend from the inside of the stocker S to the housing 6 through directly below the door 3. An opening 26 is provided directly below the door 3. The opening 26 is used to allow the pair of rails 4 and the platform members 5 to travel between the outside and the inside of the stocker S. A Y direction width and a Z direction height of the opening 26 are set to create a clearance which allows the platform member 5 to pass through the opening 26. In a case where the opening 26 through which the pair of rails 4 and the platform member 5 can pass is provided directly below the door 3, the platform member 5 can be installed in the stocker S with the door 3 closed. In such a case, it is possible to restrict the worker U from entering the stocker S through the door 3 during the work of installing the platform

members 5 in the stocker S. On the opening 26, a cover (not shown in the drawings) capable of opening and closing the opening 26 is provided. The opening 26 is closed by the cover when the platform member 5 is not installed. The opening 26 is opened by opening the cover when the platform member 5 is installed.

[0028]

Fig. 4 is a diagram of the inside of the stocker as viewed from the outside of the stocker with the door open. The pair of rails 4 are arranged in a portion inside the storage rack 2 in the stocker S. The pair of rails 4 are arranged inside the storage racks 2 on the +Y side and the -Y side. Both ends of the platform member 5 are also arranged inside the storage racks 2 on the +Y side and the -Y side. Thus, when at least parts of the pair of rails 4 and the platform member 5 are arranged inside the storage racks 2 on the +Y side and the -Y side, the space between the +Y side storage rack 2 and the -Y side storage rack 2 can be covered by the platform member 5 without any gap. In such a case, fall of objects through the gap can be reliably prevented.

[0029]

The pair of rails 4 each restrict the vertical movement and the horizontal movement (the Y direction movement) of the platform member 5. In such a case, the platform member 5 can be reliably supported and guided. The cross section of each of the pair of rails 4 orthogonal to the longitudinal direction of the rail 4 is of a C shape. The pair of rails 4 restrict the vertical movement and the horizontal movement (the Y direction movement) of the platform member 5 by having wheels 5b of the platform member 5 engaged into each C-shaped cross section.

[0030]

Returning to the description of Fig. 2, the platform member 5 will be described. A plurality of the platform members 5 are provided. Each platform member 5 has a rectangular plate shape, and by arranging the plurality of platform members 5, an integrated work platform SC is formed. Each platform member 5 includes a plurality of the wheels 5b (see Fig. 5), and can travel (move) along the pair of rails 4. The plurality of the wheels 5b are, as shown in Fig. 1, four wheels 5b that are provided on side faces on the +Y side and the -Y side of the platform member 5, respectively.

[0031]

As shown in Fig. 2, at least one of the plurality of platform members 5 includes a fence 28. The fence 28 restricts the movement of the worker U. In the following description, the platform member 5 which includes the fence 28 is referred to as fenced platform member 5A. The fenced platform member 5A is positioned on the stocker S inner side with respect to the door 3 and on the door 3 side with respect to the traveling space SP (X direction) when the transporter 1 is traveling, including the time of transporting the article F by the transporter 1 (see Fig. 1). The fenced platform member 5A is arranged across the inside of the stocker S and the outside of the stocker S via the opening 26 (see Fig. 3) and while the fence 28 is arranged on the stocker S inner side (see the fenced platform member 5A shown with the solid lines in Fig. 2). With such a configuration, the fenced platform member 5A is arranged in a dead space DS out of the travel range of the transporter 1. When the fenced platform member 5A is positioned at the above position, the fence 28 stands

upright in the vicinity of the door 3 when the door 3 is opened as shown in Fig. 4. As described above, in the case where the fenced platform member 5A is positioned on the stocker S inner side with respect to the door 3 and on the door 3 side with respect to the traveling space SP, or in the case where the fenced platform member 5A is arranged across the inside of the stocker S and the outside of the stocker S via the opening 26, and the fence 28 is arranged on the stocker S inner side, when the worker U opens the door 3 of the stocker while the work platform SC has not been formed, the fence 28 is standing upright on the stocker S inner side with respect to the door 3. Therefore, entry of the worker U into the stocker S through the door 3 can be restricted. Since the fenced platform member 5A is arranged across the inside of the stocker S and the outside of the stocker S via the opening 26 while the fence 28 is arranged on the stocker inner side and is arranged on the dead space DS, the fenced platform member 5A can be arranged without interfering with the traveling of the transporter 1. As shown by the dotted lines in Fig. 2, the fenced platform member 5A is firstly fed onto the pair of rails 4 when forming the work platform SC. Formation of the work platform SC will be described later in the operation section.

[0032]

Next, the fence 28 will be described. As shown in Fig. 4, the fence 28 is provided standing upright on the platform member 5. The fence 28 is formed such that the upper end thereof is higher than the upper end of the opening 26 (see Fig. 3). The fence 28 includes a plurality of struts 28a and a plurality of horizontal parts 28b. The struts 28a each extend upward from the platform member 5

and are arranged side by side in a direction parallel to the Y direction. Each horizontal part 28b extends in a direction parallel to the Y direction. The horizontal parts 28b are each arranged between the plurality of struts 28a and connect the plurality of struts 28a. The horizontal part 28b arranged topmost among the plurality of the horizontal parts 28b is set higher than the position of the waist of a worker U standing on the platform member 5 (see Fig. 2). In the case where the fence 28 includes the plurality of struts 28a extending upward from the platform member 5 and the plurality of horizontal parts 28b arranged between the plurality of struts 28a, and where the horizontal part 28b arranged topmost is set higher than the position of the waist of a worker U standing on the platform member 5, rigidity of the fence 28 can be improved by the plurality of struts 28a and the plurality of horizontal parts 28b. Also, since the horizontal part 28b arranged topmost is higher than the position of the waist of the worker U, the topmost horizontal part 28b can function as an effective fence for the worker U. The fence 28 is configured to meet the standards of JIS, OSHA (Occupational Safety and Health Administration) and so forth. In the present embodiment, the fenced platform member 5A stably supports the fence 28, and therefore, the front (the +X side) wheels 5b thereof are provided so as to project further forward than the platform member 5, and a distance (a wheel base) between the wheels 5b, 5b and the wheels 5b, 5b is set longer than that of the platform member 5 (see Fig. 1).

[0033]

Further, as shown in Fig. 1, the fenced platform member 5A is provided with a cutout 29. The cutout 29 is

provided on a transporter 1 side (+X side). The cutout 29 is of a shape that corresponds to the shape of the mast 9. A part of the mast 9 intrudes into the cutout 29. The cutout 29 is configured such that even when the transporter 1 moves to a position closest to the door 3 (a position on the -X side) and performs the rotation operation, as shown in Fig. 1, the movable range of the mast 9 is positioned in the cutout 29 and the cutout 29 does not interfere with the mast 9. As described above, in the case where the cutout 29 is provided in the platform member 5 which is closest to the mast 9 among the plurality of platform members 5, the platform member 5 can be arranged close to the mast 9, an outer circumferential part of which is of an arc shape by having the part of the mast 9 intruding into the cutout 29. With such a configuration, since the gap between the mast 9 and the platform member 5 is made small, fall of objects through the gap can be reduced.

[0034]

Next, coupling of the platform members 5 will be described. Fig. 5 (A) is a side view showing the platform member 5 as viewed from the -Y direction. Fig. 5 (B) and Fig. 5 (C) are diagrams showing an operation of a coupling member. Fig. 5 (D) is a view showing a state in which a plurality of the platform members are coupled. Each platform member 5 includes coupling members 30 which couple a platform member 5 with another platform member 5. The coupling members 30 include a pair of projecting hooks 31 each projecting to the traveling direction side (the +X side) of the platform member 5, and a pair of engaging pins 32. The pair of projecting hooks 31 are provided on the side faces on the -Y side and the +Y side of the platform member 5. In a lower part of each projecting hook 31, a

cutout 31a which extends upward from the lower side thereof is formed. Each projecting hook 31 is inclined from a distal end thereof to an opening end of the cutout 31a, and the inclination serves as an inclined part 31b. The pair of engaging pins 32 are provided on the side faces on the -Y side and the +Y side of a portion on the opposite side (the -X side) to the traveling direction of the platform member 5.

[0035]

Next, a coupling operation of the platform members 5 will be described. When coupling two platform members 5, as shown in Fig. 5, another platform member 5 is pressed from the rear side against the platform member 5 arranged in front (on the +X side) thereof to thereby bring the projecting hooks 31 of the rear platform member 5 into contact with the engaging pins 32 of the front platform member 5. Then, each projecting hook 31 runs on the engaging pin 32 through the inclined part 31b, and the engaging pin 32 engages with the cutout 31a as shown in Fig. 5 (C). With such configuration, the two platform members 5 are coupled. By repeating the above coupling operation, the plurality of platform members 5 are coupled as shown in Fig. 5 (D).

[0036]

Returning to the description of Fig. 2, the housing 6 houses the plurality of platform members 5. The housing 6 is provided close to the stocker S outer side with respect to the door 3. The platform members 5 other than the fenced platform member 5A among the plurality of platform members 5 are housed within the housing 6 in a state of being stacked when the transporter 1 travels. In such a case, the plurality of platform members 5 can be

efficiently stored. The pair of rails 4 are arranged so as to extend to the inside of the housing 6 and are connected to the housing 6. The plurality of platform members 5 housed in the housing 6 can be fed directly from the housing 6 onto the rails 4 when in use. The plurality of platform members 5 used for forming the work platform SC can be housed in the housing 6 directly from the pair of rails 4 at the time of housing the platform members 5. As described above, since the pair of rails 4 are connected to the housing 6, the work platform SC can be easily and simply formed. Moreover, since the plurality of platform members 5 can be housed easily, the burden on the worker U can be reduced.

[0037]

Next, a method for forming a work platform according to the embodiment is described on the basis of an operation of the transporter 1. Fig. 6 is a flowchart showing an example of a method for forming a work platform. Fig. 7 to Fig. 9 are diagrams showing operations of the stocker S. The method for forming a work platform is a method for forming a work platform in the stocker S.

[0038]

In the stocker S, in Step S1 of Fig. 6, when the transporter 1 is traveling, the platform members 5 other than the fenced platform member 5A among the plurality of platform members 5 are housed in the housing 6, and the fenced platform member 5A is positioned across the inside of the stocker S and the outside of the stocker S via the opening 26 (see Fig. 3) while positioning the fence 28 on the stocker S inner side. The platform members 5 other than the fenced platform member 5A among the plurality of platform members 5 are housed within the housing 6 in the

state of being stacked as shown in Fig. 2. With such a configuration, the plurality of platform members 5 can be efficiently stored. As shown in Fig. 7 (A), the fenced platform member 5A is positioned, on the pair of rails 4, on the stocker S inner side with respect to the door 3 and on the door 3 side with respect to the traveling space SP. With such a configuration, the fenced platform member 5A becomes the leading platform member 5 in the work platform SC. In the case of arranging the fenced platform member 5A in the position mentioned above, when the worker U opens the door 3 of the stocker while the work platform SC has not been formed, the fence 28 is standing upright on the stocker S inner side with respect to the door 3. Therefore, entry of the worker U into the stocker S through the door 3 can be restricted. Since the fenced platform member 5A is positioned at the position mentioned above when the transporter 1 travels, it is possible to reliably restrict the worker U from entering the stocker S through the door 3 while the transporter 1 is traveling.

[0039]

In the stocker S in some cases, the worker U may need to perform an operation such as maintenance work. In such a case, the work platform SC is formed at a place where work is required. Formation of the work platform SC is performed when the transporter 1 is in the stop state. Prior to forming the work platform SC, in Step S2 of Fig. 6, the transporter 1 is retreated and stopped. For example, as shown in Fig. 7 (B), the transporter 1 is moved (retreated) to and stopped at a +X side end of the stocker S. The transporter 1 need not be moved to the +X side end. For example, the position to which the transporter 1 is moved may be set according to the location of maintenance.

[0040]

Subsequently, in Step S3 of Fig. 6, the platform members 5, following the fenced platform member 5A, are fed sequentially onto the pair of rails 4 within the stocker S through the opening 26 from the housing 6 while the transporter 1 is in the stop state. For example, as shown in Fig. 8 (A), one platform member 5 is fed onto the rails 4 from the housing 6, and the platform member 5 is pressed against the fenced platform member 5A as shown in Fig. 5 (A) to Fig. 5 (C) to thereby couple the platform member 5 with the fenced platform member 5A in front thereof as shown in Fig. 5 (D). After having finished coupling the platform member 5 with the fenced platform member 5A in front thereof, the platform members 5 are sequentially fed onto the pair of rails 4 and the operation of coupling with the above platform member 5 in front is repeated. With such a configuration, the work platform SC is formed as shown in Fig. 8 (B). As described above, since formation of the work platform SC is performed while the transporter 1 is in the stop state, the contact between the platform member 5 and the transporter 1 can be suppressed when forming the work platform SC.

[0041]

In the work platform SC formed as described above, as shown in Fig. 9, the platform member 5 can be arranged close to the mast 9, an outer circumferential part of which is of an arc shape, by having the part of the mast 9 intruding into the cutout 29 of the fenced platform member 5A. With such a configuration, since the gap between the mast 9 and the platform member 5 is made small, fall of objects through the gap can be reduced. In the present embodiment, since the fence 28 is provided on the fenced

platform member 5A which is firstly fed onto the pair of rails 4, it is possible to easily form the work platform SC which includes the fence 28 at a leading position thereof, and the fence 28 can be positioned close to the stocker S inner side with respect to the door 3 when the work platform SC is not formed. In the present embodiment, since the fenced platform member 5A is positioned on the stocker S inner side with respect to the door 3, it is possible to avoid interference which arises when the fenced platform member 5A passes through the opening 26 directly below the door 3.

[0042]

As described above, According to the stocker S and the method for forming a work platform of the present invention, the platform member 5 which includes the fence 28 (the fenced platform member 5A) is arranged across the inside of the stocker S and the outside of the stocker S via the opening 26 while the fence 28 is arranged on the stocker S inner side. Therefore, the worker U can easily and simply form the work platform SC by feeding, after the platform member 5 which includes the fence 28, the other platform members 5 from the housing 6 sequentially onto the rails 4, thereby reducing the burden on the worker U. Also, when the worker U opens the door 3 of the stocker while the work platform SC has not been formed, the fence 28 is standing upright on the stocker S inner side with respect to the door 3. Therefore, entry of the worker U into the stocker S through the door 3 can be restricted.

[0043]

The embodiment of the invention has been described above. However, the present invention is not limited to the above description, and various modifications may be

made without departing from the gist of the invention. For example, in the embodiment described above, the transporter 1 is described as being a stacker crane, however, the transporter 1 need not be a stacker crane, and an arbitrary transporter may be used. In the above embodiment, the article F is described as being a FOUP, however, the article F need not be a FOUP. The stocker S can be applied to facilities of fields other than the semiconductor field.

[0044]

In the embodiment described above, the example is described in which an outer circumferential part of the mast 9 of the transporter 1 is of an arc shape, however, the shape of the mast 9 is arbitrary. For example, the shape of the mast 9 may be, when viewed from above, a substantially rectangular shape (including a square shape) or an indeterminate shape.

[0045]

In the embodiment described above, the example is described in which the platform member 5 which includes the fence 28 (the fenced platform member 5A) is positioned on the stocker S inner side with respect to the door 3 and at the door 3 side closest position with respect to the traveling space SP (X direction). However, the position of the platform member 5 which includes the fence 28 is not limited to such a position. For example, when the transporter 1 travels, on the stocker S inner side, a plurality of platform members 5 may be provided between the platform member 5 which includes the fence 28 and the door 3.

[0046]

In the embodiment described above, the example is shown in which the platform member 5 which includes the

fence 28 (the fenced platform member 5A) is positioned in the closest position to the transporter 1, among the plurality of platform members 5. However, the position of the platform member 5 which includes the fence 28 is not limited to such a position. For example, when the transporter 1 travels, on the stocker S inner side, a plurality of platform members 5 may be provided between the platform member 5 which includes the fence 28 and the transporter 1.

[0047]

In the embodiment described above, the example is described in which the platform member 5 which includes the fence 28 (the fenced platform member 5A) includes the cutout 29. However, the platform member 5 which includes the cutout 29 need not be the fenced platform member 5A. For example, the platform member 5 which includes the cutout 29 is the platform member 5 closest to the mast 9 among the plurality of platform members 5, and may be the platform member 5 which does not include the fence 28. Furthermore, the platform member 5 need not include the cutout 29. For example, if the shape of the transporter 1 or the mast 9 is rectangular as viewed from above, the cutout 29 need not be included.

[0048]

In the embodiment described above, the example is described in which the platform member 5 which includes the fence 28 (the fenced platform member 5A) is firstly fed onto the pair of rails 4. However, the platform member 5 which includes the fence 28 may be fed onto the pair of rails 4 at an arbitrary position other than the leading position. For example, the platform member 5 which includes the fence 28 may be fed onto the pair of rails 4

at any of the second position to the fifth position from the leading position. Furthermore, the contents of Japanese Patent Application No. 2017-032048 and all documents cited in the detailed description of the present invention are incorporated herein by reference to the extent permitted by law.

Description of Reference Signs

[0049]

- 1 Transporter
- 2 Storage rack
- 3 Door
- 4 Rail
- 5 Platform member
- 5A Fenced platform member (platform member which includes fence)
- 6 Housing
- 8 Traveler
- 9 Mast
- 9a Cutout
- 28 Fence
- 28a Strut
- 28b Horizontal part
- F Article
- S Stocker
- SP Traveling space
- U Worker

CLAIMS

1. A stocker comprising:

a transporter which travels through a traveling space within a stocker and transports an article;

a pair of rails which flank the traveling space and extend in parallel in a horizontal direction;

a plurality of platform members movable along the pair of rails; and

a housing which is provided on a stocker outer side of a door which separates inside and outside of the stocker, and which houses the plurality of platform members, wherein

the pair of rails are arranged so as to extend from the inside of the stocker to the housing through an opening provided directly under the door,

at least one of the plurality of platform members includes a fence in an upright standing manner and an upper end of the fence is higher than an upper end of the opening, and

the platform member which includes the fence is arranged across the inside of the stocker and the outside of the stocker via the opening while the fence is arranged on a stocker inner side.

2. The stocker according to claim 1, wherein the fence is provided on the platform member which is firstly fed onto the pair of rails.

3. The stocker according to claim 1 or 2, wherein the fence includes a plurality of struts which extend upward from the platform member, and a plurality of horizontal parts arranged between the plurality of struts,

and

the horizontal part arranged topmost is set higher than a position of the waist of a worker standing on the platform member.

4. The stocker according to any one of claims 1 to 3, wherein the platform members other than the platform member which includes the fence among the plurality of platform members are housed within the housing in a state of being stacked when the transporter travels.

5. The stocker according to any one of claims 1 to 4, wherein the transporter includes: a traveler which travels through the traveling space; a mast which is provided in a vertical direction from the traveler, an outer circumferential part of the mast being of an arc shape in plan view; and a transfer unit which is raised or lowered along the mast.

6. The stocker according to claim 5, wherein the platform member which is closest to the mast among the plurality of platform members is provided with a cutout into which the part of the mast intrudes.

7. A method for forming a work platform in a stocker including a transporter which travels through a traveling space within a stocker and transports an article,

the stocker including: a pair of rails which flank the traveling space and extend in parallel in a horizontal direction; a plurality of platform members movable along the pair of rails; and a housing which is provided on a stocker outer side of a door which separates inside and

outside of the stocker, and which houses the plurality of platform members; and the pair of rails are arranged so as to extend from the inside of the stocker to the housing through an opening provided directly under the door; and at least one of the plurality of platform members includes a fence in an upright standing manner and an upper end of the fence is higher than an upper end of the opening;

the method comprising:

housing the platform members other than the platform member which includes the fence among the plurality of platform members within the housing in a state of being stacked when the transporter travels, arranging the platform member which includes the fence across the inside of the stocker and the outside of the stocker via the opening while arranging the fence on an inner side of the stocker; and

feeding, after the platform member which includes the fence, the platform members sequentially onto the pair of rails within the stocker through the opening from the housing when the transporter stops.