APPARATUS FOR SUPPLYING SMALL PART FOR MANUFACTURING VEHICLE

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ABSTRACT

An apparatus for supplying a small part for manufacturing a vehicle includes: a stage on which a plurality of small parts are disposed; a first transferrer transferring the plurality of small parts loaded on the stage to a leading edge of the stage; a stopper which is disposed on the leading edge of the stage and which sequentially stops the plurality of small parts transferred by the first transferrer; a second transferrer transferring a first small part positioned at the stopper of the plurality of small parts; and a jig on which the first small part transferred by the second transferrer is loaded.
FIG. 2
FIG. 3
FIG. 11

First sensor

Controller

200

Lifter

790

Second sensor

Controller

Switch

771

750

710
APPARATUS FOR SUPPLYING SMALL PART FOR MANUFACTURING VEHICLE

CROSS-REFERENCE TO RELATED APPLICATION


BACKGROUND OF THE INVENTION

[0002] (a) Field of the Invention

[0003] The present invention relates to a vehicle, and in particular, to an apparatus for supplying a small part for manufacturing a vehicle.

[0004] (b) Description of the Related Art

[0005] In general, a vehicle includes a body and a chassis. Among them, the body is completed by combining a plurality of parts during passing through manufacturing lines.

[0006] In addition, a plurality of robots is used on the manufacturing lines. Such a robot holds a part provided to a selected jig, and it mounts the part to a selected portion of the body. In particular, such a part can be divided into large parts, middle parts, and small parts according to size.

[0007] However, because of the small size thereof, small parts are directly loaded to the jig by a worker.

[0008] Therefore, the worker is permanently stationed to the jig, and fatigue of the worker may become increased by a repeated action for loading.

[0009] In addition, since a next process is performed when the worker pushes a button after loading the small part to the jig, a start time of the next process may vary according to capability of the worker. Consequently, productivity may become lowered.

[0010] The above information disclosed in this Background section is only for enhancement of understanding of the background of the invention and therefore it may contain information that does not form the prior art that is already known in this country to a person of ordinary skill in the art.

SUMMARY OF THE INVENTION

[0011] Embodiments of the present invention provide an apparatus for supplying a small part for manufacturing a vehicle having advantages of automatically supplying a small part to a jig.

[0012] An apparatus for supplying a small part for manufacturing a vehicle according to an embodiment of the present invention includes: a stage on which a plurality of small parts are disposed; a first transferrer transferring the plurality of small parts loaded on the stage to a leading edge of the stage; a stopper which is disposed on the leading edge of the stage and which sequentially stops the plurality of small parts transferred by the first transferrer; a second transferrer transferring a first small part positioned at the stopper of the plurality of small parts; and a jig on which the first small part transferred by the second transferrer is loaded.

[0013] In a further embodiment according to the present invention, length of the stage is determined to accommodate the plurality of small parts at the same time and width of the stage is determined corresponding to a length of the plurality of small parts.

[0014] In another further embodiment according to the present invention, the stage includes guides, with a predetermined height, respectively disposed on left and right edges with respect to a length direction thereof.

[0015] In another further embodiment according to the present invention, the first transferrer includes a body disposed on the ground and a vibration generator, one end of which is disposed on the body and the other end of which is disposed on the stage, so as to vibrate the stage.

[0016] In another further embodiment according to the present invention, the first transferrer further includes a supporting member disposed on the stage so as to keep a leading edge of the stage higher than a trailing edge of the stage.

[0017] In another further embodiment according to the present invention, the stopper is a bracket with a predetermined height disposed on the leading edge of the stage.

[0018] In another further embodiment according to the present invention, the second transferrer includes: a first sensor detecting whether the first small part is stopped at the stopper; a holding part holding the first small part when the first small part is detected by the first sensor; a second sensor detecting whether any small part of the plurality of small parts is already loaded to the jig; and an unloading part unloading the first small part held by the holding part when there is no small part detected by the second sensor.

[0019] In another further embodiment according to the present invention, the holding part is an electromagnet.

[0020] In another further embodiment according to the present invention, the unloading part includes: a motor disposed between the leading edge of the stage and the jig; a lifter, one end of which is disposed on a spindle of the motor so as to be rotated by the motor and the other end of which is disposed on the electromagnet so as to lift the electromagnet; and a switch cutting off an electric power which is being input to the electromagnet when the first small part held by the electromagnet is positioned to the jig after the lifter is rotated by the motor.

[0021] In another further embodiment according to the present invention, the lifter includes a cylinder fixed on the spindle of the motor and a piston, one end of which is inserted into the cylinder and the other end of which is fixed to the electromagnet.

DESCRIPTION OF THE DRAWINGS

[0022] FIG. 1 is a perspective view showing an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention.

[0023] FIG. 2 is a perspective view taken in the rear direction of the apparatus for supplying a small part for manufacturing a vehicle of FIG. 1.

[0024] FIG. 3 is a cross-sectional view showing a first transferrer of the apparatus for supplying a small part for manufacturing a vehicle of FIG. 1.
Fig. 4 shows a state in which a small part is transferred forward by vibration, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention.

Fig. 5 shows a state in which a holding part is descending so as to hold a small part, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention.

Fig. 6 shows a state in which a holding part is lifting, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention.

Fig. 7 is a side view of Fig. 6.

Fig. 8 shows a state in which a holding part is rotating, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention.

Fig. 9 is a side view of Fig. 8.

Fig. 10 shows a state in which a small part is being loaded to a jig from a holding part, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention.

Fig. 11 is a block diagram showing a relation between a first sensor and an electromagnetic, and between a second sensor and a switch, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

With reference to the accompanying drawings, the present invention will be described in order for those skilled in the art to be able to implement the invention. As those skilled in the art would realize, the described embodiments may be modified in various different ways, all without departing from the spirit or scope of the present invention.

Description of Reference Numerals Indicating Primary Elements in the Drawings

<table>
<thead>
<tr>
<th>Reference Numerals</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>100: stage</td>
<td>L: length of stage</td>
</tr>
<tr>
<td>W: width of stage</td>
<td>110: guider</td>
</tr>
<tr>
<td>300: first transferer</td>
<td>310: body</td>
</tr>
<tr>
<td>330: vibration generator</td>
<td>350: supporting member</td>
</tr>
<tr>
<td>500: stopper</td>
<td>700: the second transferer</td>
</tr>
<tr>
<td>710: first sensor</td>
<td>730: holding part</td>
</tr>
<tr>
<td>750: second sensor</td>
<td>770: unloading part</td>
</tr>
</tbody>
</table>

An apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention, as shown in Figs. 1 and 2, includes a stage 100, a first transferer 300, a stopper 500, a second transferer 700, and a jig 900.

First, with reference to Fig. 1, the stage 100 will hereinafter be described in detail.

The stage 100 is where a plurality of small parts P are loaded thereon. In more detail, the stage 100 is provided with a length L thereof determined to accommodate the plurality of small parts P at the same time, and a width W thereof determined corresponding to the length of the plurality of small parts P.

In addition, the stage 100 may include guiders 110, with predetermined height, respectively disposed on left and right edges with respect to a length direction thereof. Such guiders 110 may prevent the small parts P from falling from the stage 100 when the small parts P move on the stage 100.

With reference to Figs. 1 to 3, the first transferer 300 will hereinafter be described in detail.

The first transferer 300 transfers the plurality of small parts P loaded on the stage 100 to a leading edge of the stage 100. In more detail, the first transferer 300 may include a body 310 disposed on the ground, and a vibration generator 330.

One end of the vibration generator 330 is disposed on the body 310 and the other end of the vibration generator 330 is disposed on the stage 100, such that the vibration generator 330 vibrates the stage 100. As an example, the vibration generator 330 vibrates the stage 100 left and right and it also vibrates the stage 100 up and down.

In addition, in a case that the vibration generator 330 is positioned to a rear side of the stage 100, the small parts P are aligned and transferred toward the leading edge of the stage 100 by vibration.

In addition, the first transferer 300 may further include a supporting member 350 disposed to the stage 100 so as to keep a leading edge of the stage 100 higher than a tailing edge of the stage 100.

If the vibration is generated, the small parts P loaded on the stage 100 can smoothly move due to such a supporting member 350. In particular, such a supporting member 350 may be made of a vibration-absorbing material. However, if the supporting member 350 is made of a material with rigidity, a separate vibration-absorbing member 370 may be disposed between the supporting member 350 and the stage 100.

Meanwhile, the stopper 500, as shown in Figs. 1 and 2, is disposed on the leading edge of the stage 100 so as to stop the small parts P transferred by the first transferer 300. As an example, the stopper 500 may be a bracket with a predetermined height disposed on the leading edge of the stage 100.

With reference to Figs. 1 and 2, the second transferer 700 will hereinafter be described in detail.

The second transferer 700 transfers a first small part (refer to “P1” in Fig. 4) positioned at the stopper 500 of the plurality of small parts P. In more detail, the second transferer 700 may include a first sensor 710, a holding part 730, a second sensor 750, and an unloading part 770.

The first sensor 710 detects whether the first small part P1 is stopped at the stopper 500.

The holding part 730 holds the first small part P1 when the first small part P1 is detected by the first sensor 710. As an example, the holding part 730 may be an electromagnet.

The second sensor 750 detects whether any small part of the plurality of small parts P is already loaded to the jig 900.
The unloading part 770 unloads the first small part P1 held by the holding part 730 (hereinafter, called an “electromagnet”) when there is no small part detected by the second sensor 750. In more detail, the unloading part 770 may include a motor 780, a lifter 790, and a switch (refer to “771” in FIG. 11).

The motor 780 is disposed between the stage 100 and the jig 900. In more detail, the motor 780 is mounted to a first frame 783 fixed to the ground between the stage 100 and the jig 900.

One end of the lifter 790 is disposed on a spindle 781 of the motor 780 so as to be rotated by the motor 780, and the other end thereof is disposed on the electromagnet 730 so as to lift the electromagnet 730. In more detail, the lifter 790 may include a cylinder fixed on the spindle 781 of the motor 780, and a piston 793. One end of the piston 793 is inserted into the cylinder and the other end thereof is fixed to the electromagnet 730.

The switch 771 cuts off an electric power which is being input to the electromagnet 730, when the first small part P1 held by the electromagnet 730 is positioned to the jig 900 after the lifter 790 is rotated by the motor 780. Such a switch 771, as shown in FIG. 11, is controlled by the second sensor 750 and the controller (refer to “200” in FIG. 11).

Meanwhile, the jig 900 is where the first small part P1 transferred by the second transferrer 700 is disposed to. In more detail, the jig 900 is disposed on a second frame 910, and a robot (not shown) transfers the first small part P1 therefrom to a next line.

An operation of an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention will hereinafter be described with reference to FIGS. 4 to 11.

FIG. 4 shows a state in which a small part is transferred forward by a vibration, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention. FIG. 5 shows a state in which a holding part is descending so as to hold a small part, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention.

FIG. 6 shows a state in which a holding part is lifting, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention. FIG. 7 is a side view of FIG. 6. FIG. 8 shows a state in which a holding part is rotating, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention. FIG. 9 is a side view of FIG. 8.

FIG. 10 shows a state in which a small part is being loaded to a jig from a holding part, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention. FIG. 11 is a block diagram showing a relation between a first sensor and an electromagnet, and between a second sensor and a switch, in an apparatus for supplying a small part for manufacturing a vehicle according to an exemplary embodiment of the present invention.

First, as shown in FIG. 4, the plurality of small parts P loaded at the same time to the stage 100 are transferred toward the leading edge of the stage 100 by an operation of the vibration generator (refer to “330” in FIG. 3). During the transfer of the small parts P toward the leading edge of the stage 100, the small parts P are aligned by up/down and left/right vibrations of the vibration generator 330.

Second, as shown in FIGS. 5 and 11, when the first small part P1 is detected as being at the stopper 500 by the first sensor 710, the piston 793 and the electromagnet 730 are descended by the cylinder 791 to which a control signal of the controller 200 is transmitted.

Third, as shown in FIGS. 6 and 7, the electromagnet 730 holding the first part P1 is lifted by the cylinder 791.

Fourth, as shown in FIGS. 8 and 9, when a small part is not detected as being on the jig 900 by the second sensor 750, the electromagnet 730 is rotated by the motor 780 to which a control signal of the controller 200 is transmitted, and thereby, the first small part P1 is positioned to the jig 900.

Fifth, as shown in FIGS. 10 and 11, the electric power which is being input to the electromagnet 730 is cut off by the switch 771, and thereby, the first small part P1 is loaded on the jig 900.

As has been explained, an apparatus for supplying a small part for manufacturing a vehicle according to an embodiment of the present invention may have the following advantages.

According to the embodiment of the present invention, a small part can be automatically supplied to a selected position. Consequently, productivity can become improved compared to manual supply.

In addition, according to the embodiment of the present invention, although a plurality of small parts are loaded on a stage at the same time, the small parts can be aligned and transferred toward a leading edge of the stage by up/down and left/right vibration of a vibration generator.

While this invention has been described in connection with what is presently considered to be practical exemplary embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

What is claimed is:

An apparatus for supplying a small part for manufacturing a vehicle, comprising:

1. A stage on which a plurality of small parts may be disposed;

2. A first transferrer for transferring the plurality of small parts loaded on the stage to a leading edge of the stage;

3. A stopper which is disposed on the leading edge of the stage and which sequentially stops the plurality of small parts transferred by the first transferrer;

4. A second transferrer for transferring a first small part positioned at the stopper of the plurality of small parts; and

5. A jig on which the first small part transferred by the second transferrer may be loaded.
2. The apparatus of claim 1, wherein:

- a length of the stage is configured and dimensioned to accommodate the plurality of small parts at the same time; and
- a width of the stage is configured and dimensioned corresponding to a length of the plurality of small parts.

3. The stage of claim 2, wherein the stage comprises guides, with a predetermined height, respectively disposed on left and right edges with respect to a length direction thereof.

4. The apparatus of claim 1, wherein the first transferrer comprises:

- a body disposed on the ground; and
- a vibration generator one end of which is disposed on the body and the other end of which is disposed on the stage, so as to vibrate the stage.

5. The apparatus of claim 4, wherein the first transferrer further comprises a supporting member disposed on the stage so as to keep a leading edge of the stage higher than a tailing edge of the stage.

6. The apparatus of claim 4, wherein the stopper is a bracket with a predetermined height disposed on the leading edge of the stage.

7. The apparatus of claim 1, wherein the second transferrer comprises:

- a first sensor detecting whether the first small part is stopped at the stopper;
- a holding part holding the first small part when the first small part is detected by the first sensor;
- a second sensor detecting whether any small part of the plurality of small parts is already loaded to the jig; and
- an unloading part unloading the first small part held by the holding part when there is no small part detected by the second sensor.

8. The apparatus of claim 6, wherein the holding part is an electromagnet.

9. The apparatus of claim 8, wherein the unloading part comprises:

- a motor disposed between the leading edge of the stage and the jig;
- a lifter, one end of which is disposed on a spindle of the motor so as to be rotated by the motor and the other end of which is disposed on the electromagnet so as to lift the electromagnet; and
- a switch cutting off an electric power which is being input to the electromagnet, when the first small part held by the electromagnet is positioned to the jig after the lifter is rotated by the motor.

10. The apparatus of claim 9, wherein the lifter comprises:

- a cylinder fixed on the spindle of the motor; and
- a piston, one end of which is inserted into the cylinder and the other of which is fixed to the electromagnet.

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