

Design and Implementation of Bolt Feeding Device and Bolt Assembly System

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Abstract: In this paper, a bolt feeding device and a bolt assembly system are designed and manufactured. The bolt feeding device includes: incoming parts, including a material channel, which is used to accommodate bolts; the feeding part includes a silo and a first power part. The silo is equipped with a receiving hole which can be opposite to the material channel. The bolts in the material channel can be moved to the receiving hole. The first power part is used to push the bolts in the receiving hole, so that the head of the bolt and the silo are set in the axial clearance. The above scheme can facilitate the stable pickup of bolts by downstream equipment, and can largely avoid the falling of bolts during the transfer of downstream equipment, so as to facilitate the automatic assembly of bolts.

1. Introduction

In the automatic bolt assembly process, it is necessary to supply the bolts to facilitate the grasping and use of bolts by downstream equipment. However, the current bolt feeding device generally has the problem of inconvenient grasping, resulting in the bolts easy to fall in the process of grasping and moving bolts, which is not conducive to the automatic assembly of bolts. Therefore, how to provide a solution to overcome or alleviate the above defects is still an urgent technical problem in the field^[1-3].

In order to solve the above technical problems, in this paper, a bolt feeding device and bolt assembly system is provided, in which the bolt feeding device can facilitate the stable pickup of bolts by downstream equipment, which is conducive to the automatic assembly of bolts^[4-6].

2. Design of the bolt feeding device

To solve the above technical problems, the bolt-feeding device in this design includes: the incoming parts, including the feed way, the feed way for accommodating the bolts; the feeding parts, including the housing hole, the housing hole and the feed hole, the bolt in the housing hole, and the first power unit is used to push the bolt in the housing hole, so that the bolt head and the bin are set in the axial upward gap^[7].

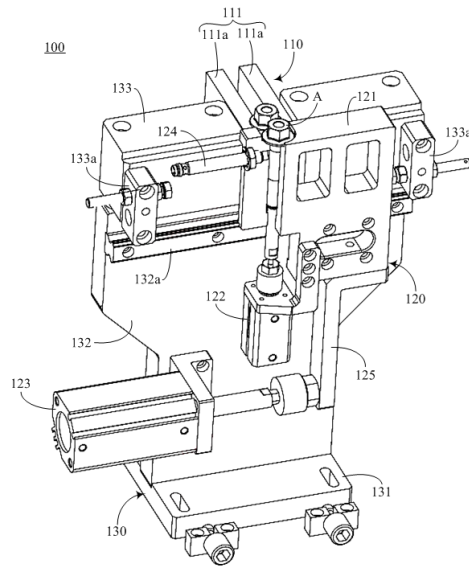


Figure 1: Bolt feeding device

100 bolt feeder, 110 feed member, 111 feed way, 111a baffle, 120 feed member, 121 bin, 122 first power unit, 123 second power unit, 124 first test member, 125 runner, 130 frame, 131 bottom plate, 132 stand, 132a rail, 133 top block, 133a limit member

In the embodiment, the feed channel may include two baffle plates of an opposite arrangement, between which an accommodating space may be formed, in which the bolt A may be provided. The feeding components include the bin and the first power section, which is provided with the accommodating hole, which can face the material channel. The t A in the feed can be moved to the accommodating hole^[8]. The first power unit is used to push the bolt A in the accommodating hole so that the head and bin of the bolt A in the accommodating hole can be presented as a gap setting in the axial direction. In this way, when the downstream equipment picks up bolt A, it can reach into the gap to directly pick up the rod part of bolt A^[9]. In this pickup mode, A natural stop can be formed between the head of bolt A and the downstream equipment, which can avoid the drop of bolt A in the downstream equipment transfer process to A large extent, as shown in Figure 1.

The bolt feeding device includes a first detection component, an infrared detection component, for detecting the state of the receiving hole, i. e., detecting the presence of bolt A in the receiving hole, and can send a corresponding signal to facilitate the operation of the device.

3. Design of the bolt assembly system

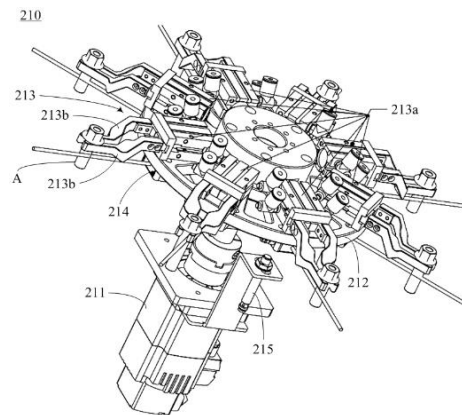


Figure 2: Bolt assembly system

Bolt assembly system, including bolt pickup device, bolt tightening device, and bolt feeding device, including bolt feeding device^[10].

200 bolt pickup and release device 200, 210 a first pickup and release mechanism, 211 a first driving unit, 212 material plate, 213, 213a second driving unit, 213b clamp portion, 214 second detecting member, 215 third detecting member, 220 second pickup and release mechanism, 221, and the second pickup and release member.

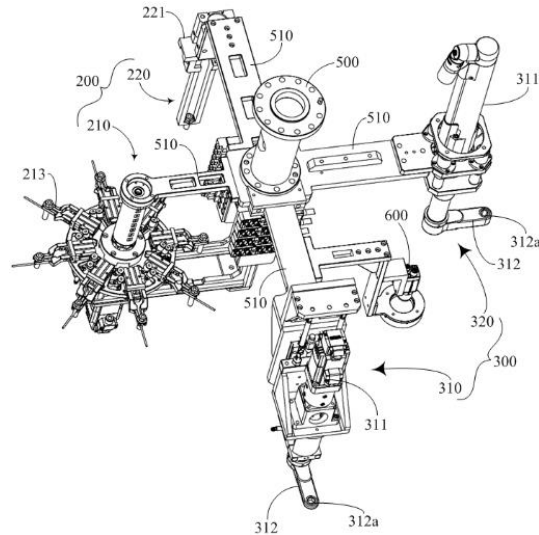


Figure 3: Connecting structure diagram of bolt withdrawal device, bolt tightening device, transition connector and visual detection components

300 bolt tightening device, 310 pre-screw mechanism, 311 third drive part, 312 offset sleeve, 312a output member, 320 tightening mechanism;

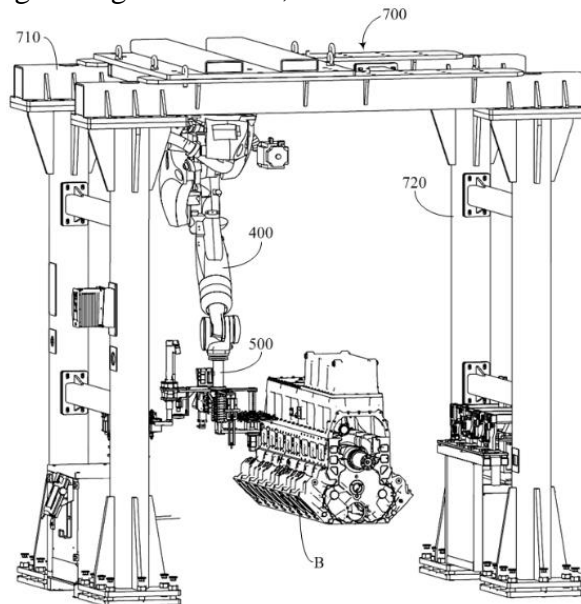


Figure 4: A structural diagram of the first access and discharging mechanism

400 mechanical arm, 500 transition connector, 510 connection arm, 600 visual detection component, 700 frame, 710 roof frame, 720 side frame.

As shown in Fig. 2, the bolt feeding device in the bolt assembly system is the bolt feeding device; the bolt feeding device is a downstream part of the bolt feeding device to collect bolt A from the

bolt feeding device and can transport the obtained bolt A to be connected and then placed in the connecting hole of the part to be connected; the bolt tightening device tightens the bolt A in the connecting hole to ensure reliable assembly of the bolt A.

In connection with Fig. 3 and 4, the bolt pickup and discharging device includes a first pickup and discharging mechanism including a first driving unit and a material plate. The first drive section and the material plate can be connected to drive the material disk to move. The material plate is provided with a plurality of interspaced first withdrawing members for withdrawing and discharging bolt A. Thus, under the first driving part, the first discharging parts of the material plate are coordinated with the bolt feeding device to pick the bolt A. That is to say, the first pickup and discharging mechanism realizes the pickup of multiple bolts A, which has a positive significance for improving the installation efficiency and saving the installation time. The first pickup and discharging mechanism includes a second detection part, an infrared detection part, and the second detection part is used to detect the working state of the first pickup and discharging part to determine whether the first pickup and discharging part is picked up or released the bolt A. After the second detecting part determines that the first withdrawing and discharging part is picked up or releases the bolt A, it sends a signal to the first driving unit, which controls the material plate to move in order to switch different first withdrawing and discharging parts to pick up or release the bolt A. There is a one-to-one correspondence relationship between the second detecting component and the first pickup and discharging component, so that each second detecting component only needs to detect the working state of the corresponding first pickup and discharging component.

The bolt assembly system includes the mechanical arm, the bolt pickup and discharging device and the bolt tightening device are assembled in the mechanical arm to improve the integration and compactness of the equipment, and the mechanical arm drives the bolt pickup and discharging device and the bolt tightening device for synchronous displacement. The transition connector is installed in the mechanical arm, and the bolt pickup and discharging device and the bolt tightening device are installed in the transition connector. The transition connector provides the installation point to realize the integrated assembly of the bolt device and the bolt tightening device, and then, the transition connector is connected to the mechanical arm. The bolt assembly system also includes a frame, and the frame includes the top frame and the side frame, the number of side frames is two, and the two frames are arranged apart, and can be connected to the top frame. The mechanical arm is hung below the top frame, so that the occupation of ground space can be reduced, can save production space, and is conducive to ensure the safety of production.

4. Conclusion



Figure 5: Implementation device

According to the above design drawings, the bolt feeding device and bolt assembly system are made, which can meet the bolt feeder assembly of each type. The bolt assembly system can be unmanned production, the feeding of bolt A can be automatically completed by the bolt feeding device, and the bolt A can be automatically completed by the bolt pickup and discharging device, and the bolt A can be automatically completed by the bolt tightening device, equipment degree of automation is high, can reduce the error caused by manual participation, and can improve the reliability of bolt connection, As shown in Figure 5.

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