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(54) VISUAL IDENTIFICATION-BASED FULL-AUTOMATIC FLANGE MARKING MACHINE

(57) A visual identification-based full-automatic flange labeling machine, comprising a pneumatic chuck (1) provided with a first detection unit, a rotation mechanism (45) connected to the pneumatic chuck, a linear push mechanism (2) connected to the rotation mechanism, a visual identification system (5), a labeling actuator (6), a return-to-zero limiting mechanism, a workbench (7) and a controller (8). The visual identification system, the labeling actuator and the linear push mechanism are all fixed to the workbench. The rotation mechanism rotates a flange on the pneumatic chuck. The linear push mechanism pushes the flange to a labeling position and pushes the flange out of the labeling position. The labeling actuators are used for printing a new label on the flange. The linear push mechanism is provided with the return-to-zero limiting mechanism for limiting the pneumatic chuck. A second detection unit is arranged between the linear push mechanism and the pneumatic chuck and is used for detecting whether the pneumatic chuck returns to zero to be reset. The present labeling machine may improve the automation level of flange labeling.

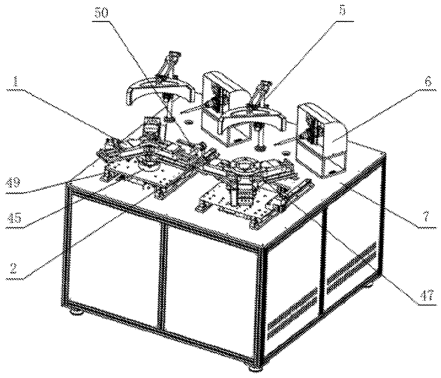

FIG. 1

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present disclosure relates to the field of automatic flange processing, and more particularly to, a visual identification-based full-automatic flange labeling machine.

Description of Related Art

[0002] In the pipe flange processing field such as shipbuilding, chemical industry, wind power, etc., labeling on the circumferential surface of the flanges are low in production efficiency and poor in quality, which is mainly manifested in that: 1. loading and unloading of the flange are manually conducted and the chuck is tightened or loosened manually; 2. an initial label position on the flanges are manually identified and a new labeling position is manually specified, generally leading to overlapping of the new label and the initial label and thus causing an identification failure; 3. there is no check process for the new labeling content, resulting in a labeling error; 4. the labeling process produces loud noise and there are no corresponding sound insulation measures; and 5. the previous device belongs to semi-automatic equipment and cannot achieve full-automatic labeling.

SUMMARY OF THE PRESENT INVENTION

Technical Problem

[0003] The present disclosure aims to provide a visual identification-based full-automatic flange labeling machine, so as to enhance the automation level of flange labeling.

Technical Solution

[0004] The technical solution for achieving the objective of the present disclosure is as follows:

[0005] A visual identification-based full-automatic flange labeling machine is provided, which includes a pneumatic chuck, a rotation mechanism, a linear push mechanism, a visual identification system, labeling actuators, a return-to-zero limiting mechanism, a workbench, and a controller, where

the visual identification system, the labeling actuators and the linear push mechanism are all fixed to the workbench; the pneumatic chuck is connected to the rotation mechanism, and is used for fixing a flange; a first detection unit is provided on the pneumatic chuck and is used for detecting whether the flange is mounted on the pneumatic chuck; when the first detection unit detects that there is a flange mounted on the pneumatic chuck, the pneumatic chuck automatically clamps and fastens the flange; the rotation mechanism is connected to the linear push mechanism, and is used for rotating the flange on the pneumatic chuck; the linear push mechanism makes a linear reciprocating motion, and is used for pushing the flange to/out of a labeling position; when the linear push mechanism arrives at the labeling position, the visual identification system detects the flange and identifies an initial label position on the flange; the labeling actuator avoids the initial label position through the rotation of the rotation mechanism, and the labeling actuator is used for printing a new label on the flange; the linear push mechanism is disposed with the return-to-zero limiting mechanism which is used for limiting, after labeling completion, the pneumatic chuck after the chuck returns to zero to be reset; a second detection unit is arranged between the linear push mechanism and the pneumatic chuck and is used for detecting whether the pneumatic chuck returns to zero to be reset, so as to control the return-to-zero limiting mechanism to automatically limit the pneumatic chuck; and the controller is used for controlling operation of the pneumatic chuck, the rotation mechanism, the linear push mechanism, the visual identification system, the labeling actuators, and the return-to-zero limiting mechanism.

Advantageous Effects

[0006] Compared to the prior art, the present disclosure has the following obvious advantages:

(1) The visual identification-based full-automatic flange labeling machine of the present disclosure conducts loading, delivery, rotation, and automatic identification of a labeling position, realizing full-automatic labeling of the whole flange.

(2) In the visual identification-based full-automatic flange labeling machine of the present disclosure, flanges of different sizes can be clamped and fastened on the pneumatic chuck. Swing rods are further disposed, so that the three double-rod air cylinders are consistent in motion, thus ensuring the accuracy of center alignment between the flange and the pneumatic chuck after the flange is tightly clamped to the pneumatic chuck.

(3) In the present disclosure, the visual identification system is used to identify the position of the initial label. The rotation mechanism rotates to complete transfer flanges to a new labeling position, and the labeling actuator is further used to adjust labeling positions on different flanges. After labeling completion, the rotation mechanism is automatically reset, and mechanical position limitation is realized by using the return-to-zero limiting mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]

FIG. 1 is a schematic three-dimensional structural diagram of a visual identification-based full-automatic labeling machine of the present disclosure;

FIG. 2 is a schematic three-dimensional structural diagram of a pneumatic chuck and a rotation mechanism;

FIG. 3 is a schematic three-dimensional structural diagram of a back side of a pneumatic chuck not carrying a flange;

FIG. 4 is a schematic three-dimensional structural diagram of a labeling actuator;

FIG. 5 is a schematic three-dimensional structural diagram of a visual identification system;

FIG. 6 is a schematic three-dimensional structural diagram of a full-automatic labeling machine with a soundproof housing;

FIG. 7 is a schematic three-dimensional structural diagram of a noise enclosure;

FIG. 8 is a schematic three-dimensional structural diagram of a back side of a workbench; and

FIG. 9 is a schematic three-dimensional structural diagram of a pneumatic chuck carrying a flange and a rotation mechanism.

DETAILED DESCRIPTION OF EMBODIMENTS

[0008] The present disclosure is further described below with reference to the accompanying drawings and a specific embodiment.

[0009] Referring to FIG. 1, a visual identification-based full-automatic flange labeling machine of the present disclosure includes a pneumatic chuck 1, a rotation mechanism 45, a linear push mechanism 2, a visual identification system 5, labeling actuators 6, a return-to-zero limiting mechanism, a workbench 7, and a controller 8.

[0010] The visual identification system 5, the labeling actuators 6 and the linear push mechanism 2 are all fixed to the workbench 7. The pneumatic chuck 1 is connected to the rotation mechanism 45, and is used for fixing a flange from an inner hole of the flange. A first detection unit is provided on the pneumatic chuck 1 and is used for detecting whether the flange is mounted on the pneumatic chuck 1. When the first detection unit detects that there is a flange mounted on the pneumatic chuck, the pneumatic chuck 1 automatically clamps and fastens the flange. The rotation mechanism 45 is connected to the linear push mechanism 2, and is used for rotating the flange on the pneumatic chuck 1 at a certain angle, so as to avoid an initial label position. The linear push mechanism 2 makes a linear reciprocating motion, and is used for pushing the flange to/out of a labeling position. When the linear push mechanism 2 arrives at the labeling position, the visual identification system 5 detects the flange and identifies an initial label position on the flange. The rotation mechanism 45 rotates at a certain angle so that the labeling actuator 6 avoids the initial label position, and the labeling actuator 6 is used for printing a new label on the flange. The linear push mechanism 2 is disposed with the return-to-zero limiting mechanism which is used for limiting, after labeling completion, the pneumatic chuck 1 after the chuck returns to zero to be reset. A second detection unit is arranged between the linear push mechanism 2 and the pneumatic chuck 1 and is used for detecting whether the pneumatic chuck 1 returns to zero to be reset, so as to control the return-to-zero limiting mechanism to automatically limit the pneumatic chuck 1. The controller 8 is used for controlling operation of the pneumatic chuck 1, the rotation mechanism 45, the linear push mechanism 2, the visual identification system 5, the labeling actuators 6, and the return-to-zero limiting mechanism.

[0011] Further, the linear push mechanism 2 includes linear guide rails 49, a slider 49, and a drive unit. Two parallel guide rails 49 are fixed on the workbench 7. The slider 3 is fitted to the guide rails 49, and the drive unit is connected to the slider 3, to drive the slider 3 to make a linear reciprocating motion along the guide rails 49.

[0012] Further, the drive unit includes a drive motor 44 and a lead screw 50. The drive motor 44 is fixed on the back side of the workbench 7, and is disposed with a driving pulley on a rotation shaft. The lead screw 50 is supported via a bearing pedestal at two ends on the front side of the workbench 7. The lead screw 50 is disposed with a driven pulley at one end, and the driving pulley and the driven pulley are driven via a belt 43. A nut of the lead screw 50 is connected to the slider 3.

[0013] Further, the rotation mechanism includes a rotation motor 13, a transmission shaft 33, and an air channel slip ring 23. The rotation motor 13 is fixed on the back side of the workbench 7, and is disposed with a driving pulley on a rotation shaft, where the driving pulley is connected to a driven pulley 21 via a belt 12. The driven pulley 21 is fixedly connected to the transmission shaft 33. An upper end of the transmission shaft 33 passes through the slider 3 of the linear push mechanism 2 and is connected to the pneumatic chuck 1. A bearing support is disposed between the transmission shaft 33 and the slider 3 of the linear push mechanism 2. The transmission shaft 33 is disposed with the air channel slip ring 23 at the lower end. A through hole for air channel connection to the pneumatic chuck 1 is provided in the middle of the transmission shaft 33, and the air channel slip ring 23 is used to stably supply air when the pneumatic chuck 1 is in a rotation condition.

[0014] Further, the pneumatic chuck 1 includes three double-rod air cylinders 18, three flange clamping pieces, three swing rods 30, and a base 46. The three double-rod air cylinders 18 are arranged at 120° on the base 46 with the transmission shaft 33 of the rotation mechanism as the center. The three flange clamping pieces are respectively fixedly connected to the three double-rod air cylinders 18 and used for fixing the flange from the inner hole of the flange. The first detection unit is inlaid in the clamping piece. The base 46 is provided with three notches 461 arranged at 120°. The transmission shaft 33 of the rotation mechanism is connected to a rotation support

seat 31 via a bearing. One ends of the three swing rods 30 are all rotatably connected to the rotation support seat 31 via a rotation shaft, and the other ends are connected to the three double-rod air cylinders 18 via rotation shafts respectively. The three swing rods 30 can oscillate along the notches 461 with the reciprocating motion of the three double-rod air cylinders 18, so that upper flange clamping pieces above the three double-rod air cylinders 18 are consistent in motion, thus ensuring the accuracy of center alignment between the flange and the pneumatic chuck 1 after the flange is tightly clamped to the pneumatic chuck 1. Due to differences in part processing and air channel layout, the compressed air supplied to the double-rod air cylinders 18 varies in a pressure loss. Therefore, the three double-rod air cylinders 18 are poorly consistent in motion, thus failing to ensure the accuracy of alignment. In order to avoid the foregoing problem, the motion routes of the three double-rod air cylinders are synchronized by means of mechanical connection. The three double-rod air cylinders 18 are connected to the rotation support seat (31) respectively via the swing rods 30, realizing the consistent motion routes.

[0015] Further, each flange clamping piece includes an upper clamping piece 15 and a lower clamping piece 14. The upper clamping piece 15 is fixed on the lower clamping piece 14. A flange with a relatively small internal diameter is placed on the upper clamping piece 15, and a flange with a relatively large internal diameter is placed on the lower clamping piece 14. An arc-shaped boss 51 is disposed at the inner side of the upper clamping piece 15, and is used for positioning an inner hole of the flange with a relatively small internal diameter. The outer side end of the clamping piece 15 is an arc-shaped structure which is used for positioning an inner hole of the flange with a relatively large internal diameter and serve as a positioning boss of the lower clamping piece 14 for positioning the inner hole of the flange. A first magnetic switch 16 is inlaid in the upper clamping piece 15, and a second magnetic switch 17 is inlaid in the lower clamping piece 14. The two magnetic switches are used as the first detection unit for detecting whether there are flanges on the two clamping pieces.

[0016] Further, the return-to-zero limiting mechanism includes a single-rod air cylinder 11, an air cylinder mounting seat 10, and a locating pin 9. The single-rod air cylinder 11 is fixed on the slider 3 via the air cylinder mounting seat 10, and the locating pin 9 passes through the air cylinder mounting seat 10 and is connected to the single-rod air cylinder 11. The base 46 is provided with a positioning pin hole 48 at the bottom end. A photoelectric switch is disposed between the air cylinder mounting seat 10 and the base 46 as the second detection unit for detecting whether the pneumatic chuck 1 returns to zero to be reset. After labeling completion, the rotation mechanism 45 drives the pneumatic chuck 1 to rotate. When the photoelectric switch detects that the chuck rotates to be reset, the single-rod air cylinder 11 drives the locating pin 9 to be inserted into the positioning pin hole 48, realizing the limiting action of the machine returning to zero. When labeling is required, the single-rod air cylinder 11 drives the locating pin 9 to retract, realizing unlocking.

[0017] Further, the visual identification system 5 includes a bracket 42, a light source 40, and a camera 41. The light source 40 and the camera 41 are both fixed on the workbench 7 via the bracket 42. When the linear push mechanism 2 pushes the flange to the labeling position, the rotation mechanism 45 drives the flange to rotate. The visual identification system 5 automatically performs visual identification for the circumferential surface of the flange on the pneumatic chuck 1, so as to identify positions of an initial label, namely, start and end positions of the initial label; and automatically feeds back the positions to the controller 8. After acquiring the initial label position, the controller 8 controls the rotation mechanism 45 to rotate at a certain angle to avoid the initial label position, and the labeling actuator 6 prints a new label on the flange. After labeling completion, the visual identification system 5 checks the newly printed label. The camera 41 is used to acquire the content during identification, and the light source 40 can adjust the light environment so as to obtain an optimal acquisition environment.

[0018] Further, the labeling actuator 6 includes a mounting seat 54, a labeling pin 37, a vertical slider 36, a vertical guide rail 35, a horizontal slider 38, and a horizontal guide rail 39. The labeling pin 37 is fixed to the vertical slider 36 and vertically moves along the vertical guide rail 35 via the vertical slider 36. The vertical guide rail 35 is fixed to the horizontal slider 38, and horizontally moves along the horizontal guide rail 39 via the horizontal slider 38. The horizontal guide rail 39 is fixed to the mounting seat 54, and the mounting seat 54 is fixed to the workbench 7. The two slides are both driven by a linear stepping motor. The labeling machine is provided with an operation interface. Because different flanges differ in the outer diameter and thickness, a horizontal sliding value and a vertical sliding value of the first flange may be measured by adjustment during an actual application. By size comparison with the first flange, other flanges are adjusted to obtain offset values, and horizontal sliding values and vertical sliding values are offset from the corresponding values of the first flange. Finally, the values are input through the operation interface, to roughly determine a labeling position. The labeling actuator 6 is disposed with an air source pressure regulator 4, which is used for adjusting a pressure value of the compressed air at an inlet of the labeling actuator 6, thus finally realizing adjustment of a labeling depth value of the flange. The labeling pin 37 is connected to the air source pressure regulator 4 via a reversing valve. The labeling actuator 6 enables the labeling pin 37 to perform a labeling operation on the flange by means of an impact force from the compressed air and high frequency reversal of the reversing valve. The air source pressure regulator 4 is the main inlet of the compressed air of the whole device. After entering the device through the air source pressure

regulator 4, the compressed air is supplied to the labeling pin 37 and the three double-rod air cylinders separately via pipe branch connectors.

[0019] Further, the whole labeling machine is further disposed with a noise enclosure for reducing the noise in the labeling process. The noise enclosure includes an automatic sliding door 24, and a frame 25 with closed perimeters and an open top end. The frame 25 is fixed on the workbench 7, and the automatic sliding door 24 is disposed on the top end of the frame 25. After the first detection unit detects the loading completion of the flange, the automatic sliding door (24) is automatically closed. In this case, the flange is subjected to labeling in a closed space. After completion of flange labeling, the automatic sliding door (24) is automatically opened. The automatic sliding door 24 is automatically opened and closed by an air cylinder (29) driving a link mechanism 27. The air cylinder (29) is fixed inside the frame 25, and the link mechanism 27 is connected to the automatic sliding door 24. The automatic sliding door 24 is able to slide with respect to the frame 25, and is automatically opened and closed by the air cylinder 29 pulling the automatic sliding door 24 to move back and forth.

[0020] The full-automatic flange labeling machine of the present disclosure has the following working process: After a controller 8 receives a labeling task, the automatic sliding door 24 is automatically opened. When the first magnetic switch 16 or the second magnetic switch 17 detects that there is a flange 47, it indicates loading of the flange 47 is completed, and then the automatic sliding door 24 is automatically closed, to start the labeling operation. The three double-rod air cylinders 18 of the pneumatic chuck 1 synchronously move outwards, and the flange 47 is tightly clamped via synchronous movement of the three flange clamping pieces. The linear push mechanism 2 drives the pneumatic chuck 1 carrying the flange 47 and the rotation mechanism 45 via the slider 3 to enter a working area of the labeling actuator 6 and the visual identification system 5. The pneumatic chuck 1 drives the flange 47 to automatically rotate, and the visual identification system 5 takes pictures to identify start and end positions of an initial label 55 on the flange 47 and feeds back the positions to the controller 8. The controller 8 controls the pneumatic chuck 1 to automatically avoid a circumferential area of the initial label 55 and to automatically rotate to a new labeling start position, and controls the labeling pin 37 of the labeling actuator 6 to automatically move to the labeling start position. The pneumatic chuck 1 automatically rotates to cooperate with the labeling actuator 6 to synchronously perform the making operation, thus gradually implementing the labeling task of printing all the new labels on the flange 47. After labeling completion, the controller 8 controls the labeling pin 37 to automatically return to zero. The linear push mechanism 2 drives the pneumatic chuck 1 carrying the flange 47 and the rotation mechanism 45 via the slider 3 to depart from the working area of the labeling actuator 6 and the visual identification system 5 and automatically return to an initial position. The pneumatic chuck 1 automatically returns to zero, and the positioning pin 9 is automatically inserted into the positioning pin hole (48), realizing the limiting action of the machine returning to zero. The three double-rod air cylinders 18 of the pneumatic chuck 1 synchronously move inwards, so that the three flange clamping pieces complete a loosening action. The automatic sliding door 24 is automatically opened. The controller 8 sends a labeling completion signal to an upper computer, and the upper computer controls an unloading mechanism or a robot to automatically seize the flange 47. When the first magnetic switch 16 or the second magnetic switch 17 detects that no flange 47 exists, it indicates that unloading of the flange 47 is completed, and the automatic sliding door 24 is automatically closed. After completion of the labeling task, the machine waits for a next labeling task.

Claims

1. A visual identification-based full-automatic flange labeling machine, comprising a pneumatic chuck (1), a rotation mechanism (45), a linear push mechanism (2), a visual identification system (5), labeling actuators (6), a return-to-zero limiting mechanism, a workbench (7), and a controller (8), wherein
the visual identification system (5), the labeling actuators (6) and the linear push mechanism (2) are all fixed to the workbench (7); the pneumatic chuck (1) is connected to the rotation mechanism (45), and is used for fixing a flange; a first detection unit is provided on the pneumatic chuck (1) and is used for detecting whether the flange is mounted on the pneumatic chuck (1); when the first detection unit detects that there is a flange mounted on the pneumatic chuck, the pneumatic chuck (1) automatically clamps and fastens the flange; the rotation mechanism (45) is connected to the linear push mechanism (2), and is used for rotating the flange on the pneumatic chuck (1); the linear push mechanism (2) makes a linear reciprocating motion, and is used for pushing the flange to/out of a labeling position; when the linear push mechanism (2) arrives at the labeling position, the visual identification system (5) detects the flange and identifies an initial label position on the flange; the labeling actuator avoids the initial label position through the rotation of the rotation mechanism (45), and the labeling actuator (6) is used for printing a new initial on the flange; the linear push mechanism (2) is disposed with the return-to-zero limiting mechanism which is used for limiting, after labeling completion, the pneumatic chuck (1) after the pneumatic chuck returns to zero to be reset; a second detection unit is arranged between the linear push mechanism (2) and the pneumatic chuck (1) and is used for detecting whether the pneumatic chuck (1) returns to zero to be reset, so as to control

the return-to-zero limiting mechanism to automatically limit the pneumatic chuck (1); and the controller (8) is used for controlling operation of the pneumatic chuck (1), the rotation mechanism (45), the linear push mechanism (2), the visual identification system (5), the labeling actuators (6), and the return-to-zero limiting mechanism.

2. The visual identification-based full-automatic flange labeling machine according to claim 1, wherein the linear push mechanism (2) comprises linear guide rails (49), a slider (3), and a drive unit; two parallel guide rails (49) are fixed on the workbench (7); the slider (3) is matched with the guide rails (49); and the drive unit is connected to the slider (3), to drive the slider (3) to make a linear reciprocating motion along the guide rails (49).

3. The visual identification-based full-automatic flange labeling machine according to claim 1, wherein the drive unit comprises a drive motor (44) and a lead screw (50); the drive motor (44) is fixed on the back side of the workbench (7), and is disposed with a driving pulley on a rotation shaft; the lead screw (50) is supported via a bearing pedestal at two ends on the front side of the workbench (7); the lead screw (50) is disposed with a driven pulley at one end, and the driving pulley and the driven pulley are driven via a belt (43); and a nut of the lead screw (50) is connected to the slider (3).

4. The visual identification-based full-automatic flange labeling machine according to claim 1, wherein the rotation mechanism comprises a rotation motor (13), a transmission shaft (33), and an air channel slip ring (23); the rotation motor (13) is fixed on the back side of the workbench (7), and is disposed with a driving pulley on a rotation shaft, wherein the driving pulley is connected to a driven pulley (21) via a belt (12); the driven pulley (21) is fixedly connected to the transmission shaft (33); an upper end of the transmission shaft (33) passes through the linear push mechanism (2) and is connected to the pneumatic chuck (1); a bearing support is disposed between the transmission shaft (33) and the linear push mechanism (2); the transmission shaft (33) is disposed with the air channel slip ring (23) at the lower end; and a through hole for air channel connection to the pneumatic chuck (1) is provided in the middle of the transmission shaft (33), and the air channel slip ring (23) is used to stably supply air when the pneumatic chuck (1) is in a rotation condition.

5. The visual identification-based full-automatic flange labeling machine according to claim 1, wherein the pneumatic chuck (1) comprises three double-rod air cylinders (18), three flange clamping pieces, three swing rods (30), and a base (46); the three double-rod air cylinders (18) are arranged at 120° on the base (46) with the rotation mechanism as the center; the three flange clamping pieces are respectively fixedly connected to the three double-rod air cylinders (18) and used for fixing the flange from an inner hole of the flange; the first detection unit is inlaid in the clamping piece; the base (46) is provided with three notches (461) arranged at 120°; the rotation mechanism is connected to a rotation support seat (31) via a bearing; and one ends of the three swing rods (30) are all rotatably connected to the rotation support seat (31) via a rotation shaft, and another ends of the three swing rods are connected to the three double-rod air cylinders (18) via rotation shafts respectively.

6. The visual identification-based full-automatic flange labeling machine according to claim 5, wherein each flange clamping piece comprises an upper clamping piece (15) and a lower clamping piece (14); the upper clamping piece (15) is fixed on the lower clamping piece (14); a flange with a relatively small internal diameter is placed on the upper clamping piece (15), and a flange with a relatively large internal diameter is placed on the lower clamping piece (14); and an arc-shaped boss (51) is disposed at the inner side of the upper clamping piece (15), and the outer side end of the clamping piece (15) is an arc-shaped structure.

7. The visual identification-based full-automatic flange labeling machine according to claim 1, wherein the return-to-zero limiting mechanism comprises a single-rod air cylinder (11), an air cylinder mounting seat (10), and a locating pin (9); the single-rod air cylinder (11) is fixed on the slider (3) via the air cylinder mounting seat (10), and the locating pin (9) passes through the air cylinder mounting seat (10) and is connected to the single-rod air cylinder (11); the base (46) is provided with a positioning pin hole (48) at the bottom end; a second detection unit is disposed between the air cylinder mounting seat (10) and the base (46) and used for detecting whether the pneumatic chuck (1) returns to zero to be reset.

8. The visual identification-based full-automatic flange labeling machine according to claim 1, wherein the visual identification system (5) comprises a bracket (42), a light source (40), and a camera (41); and the light source (40) and the camera (41) are both fixed on the workbench (7) via the bracket (42).

9. The visual identification-based full-automatic flange labeling machine according to claim 1, wherein the labeling actuator (6) comprises a mounting seat (54), a labeling pin (37), a vertical slider (36), a vertical guide rail (35), a horizontal slider (38), and a horizontal guide rail (39); the labeling pin (37) is fixed to

the vertical slider (36) and vertically moves along the vertical guide rail (35) via the vertical slider (36); the vertical guide rail (35) is fixed to the horizontal slider (38), and horizontally moves along the horizontal guide rail (39) via the horizontal slider (38); the horizontal guide rail (39) is fixed to the mounting seat (54); and the mounting seat (54) is fixed to the workbench (7).

10. The visual identification-based full-automatic flange labeling machine according to claim 1, wherein a noise enclosure is further provided; the noise enclosure comprises an automatic sliding door (24), and a frame (25) with closed perimeters and an open top end; the frame (25) is fixed on the workbench (7); and the automatic sliding door (24) is disposed on the top end of the frame (25)

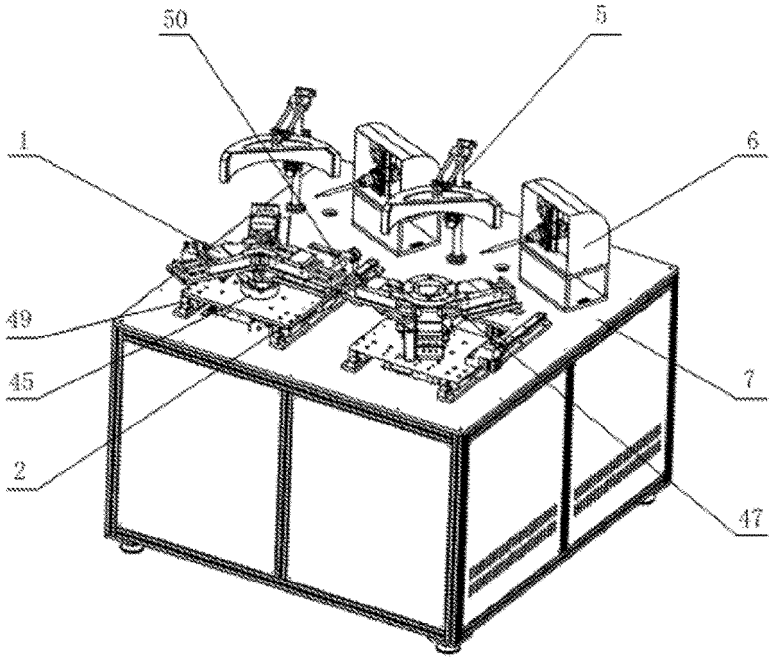

FIG. 1

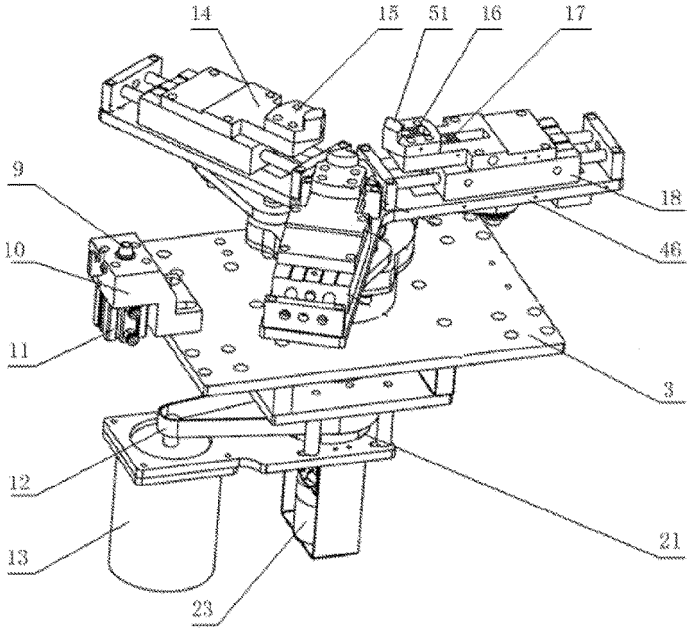

FIG. 2

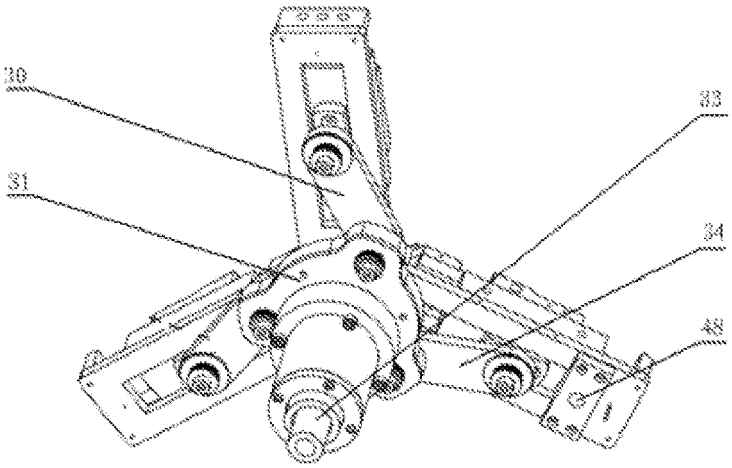

FIG. 3

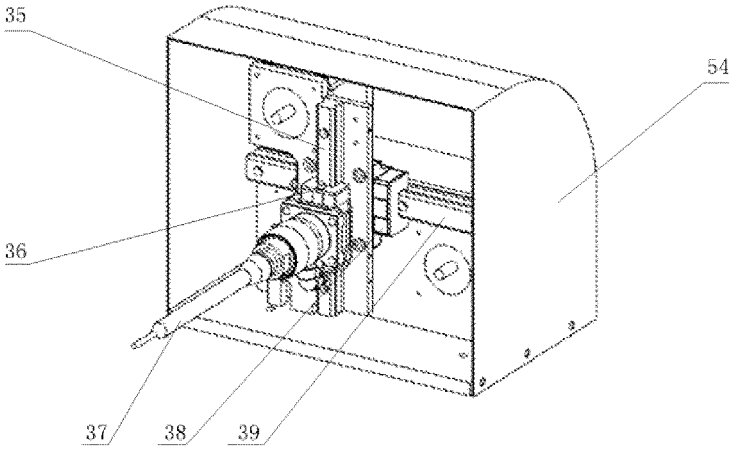

FIG. 4

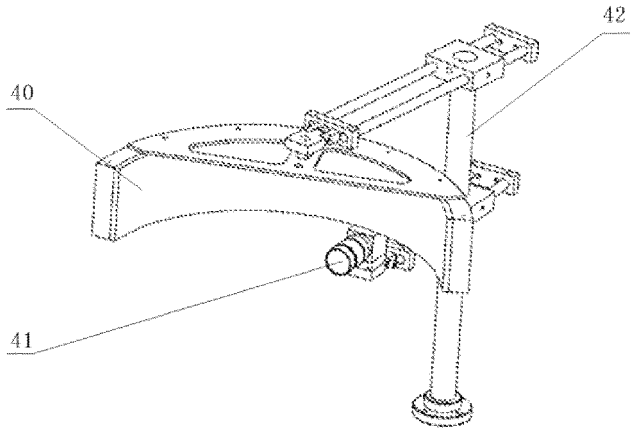

FIG. 5

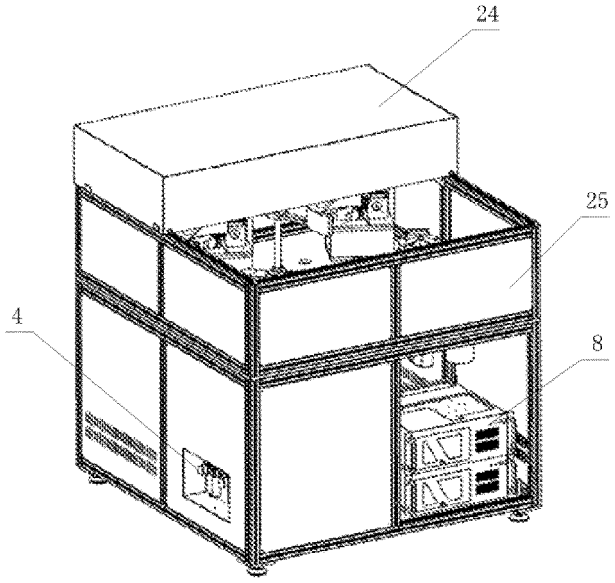

FIG. 6

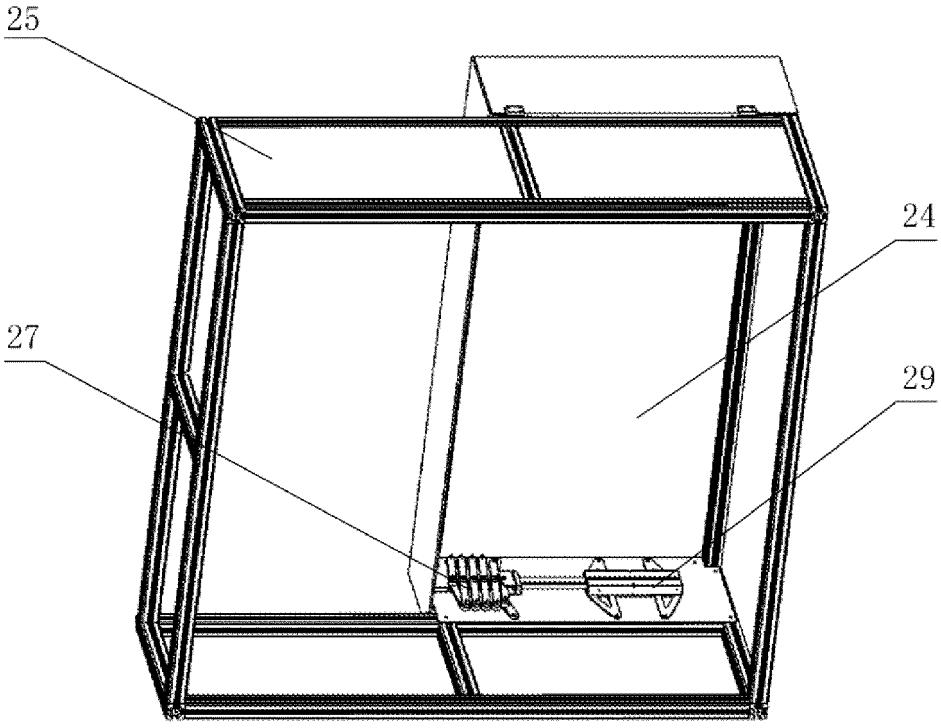

FIG. 7

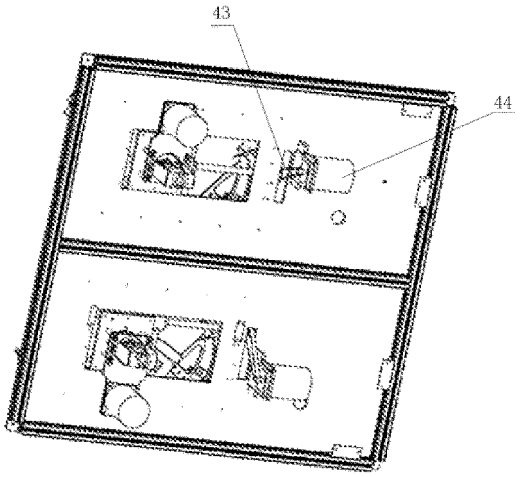

FIG. 8

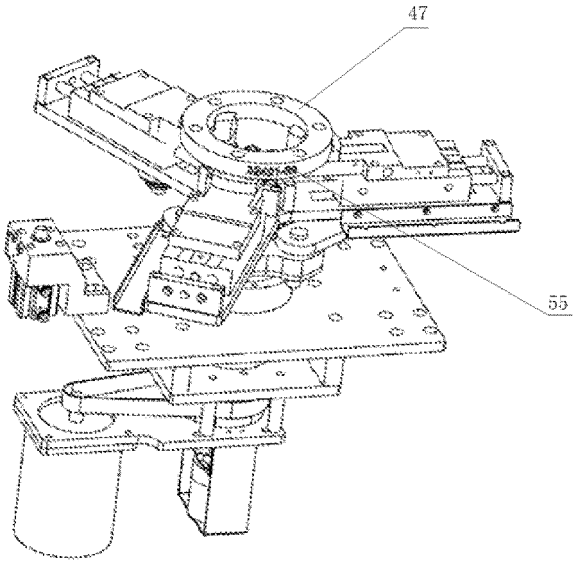

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/072340

A. CLASSIFICATION OF SUBJECT MATTER

B41J 3/407(2006.01)i; B23K 26/362(2014.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B41J;; B23K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, CNTXT, CNKI, VEN: 打码, 打标, 旋转, 回转, 转动, 移动, 治具, 卡, 夹, 法兰, 回零, 归零, 归位, 视觉, 相机, 摄像, 拍照, mark+, rotat+, mov+, cartridge?, chuck?, socket?, holding, clamp+, flange?, reset+, visual, imag+, camera

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 205326512 U (GUANGZHOU BIMEI HIGH LASER TECHNOLOGY CO., LTD.) 22 June 2016 (2016-06-22) description, paragraphs [0021]-[0023], and figure 1	1-10
Y	CN 208895486 U (HUAHENG WELDING CO., LTD. et al.) 24 May 2019 (2019-05-24) description, paragraphs [0033]-[0052], and figures 1-16	1-10
A	CN 208450832 U (GUANGZHOU BIMEI HIGH LASER TECHNOLOGY CO., LTD.) 01 February 2019 (2019-02-01) entire document	1-10
A	CN 208906353 U (SHENZHEN BEYOND LASER INTELLIGENT EQUIPMENT CO., LTD.) 28 May 2019 (2019-05-28) entire document	1-10
A	CN 109532248 A (XIAMEN GONGKE AUTOMATIC EQUIPMENT CO., LTD.) 29 March 2019 (2019-03-29) entire document	1-10
A	CN 109702350 A (NING, Jianyang) 03 May 2019 (2019-05-03) entire document	1-10

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 March 2020	**15 April 2020**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China**	Authorized officer
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/072340

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 03003820 A1 (ALEIS TRAKIT PTY LTD. et al.) 16 January 2003 (2003-01-16) entire document	1-10

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2020/072340

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
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CN 208895486 U	24 May 2019	None	
CN 208450832 U	01 February 2019	None	
CN 208906353 U	28 May 2019	None	
CN 109532248 A	29 March 2019	None	
CN 109702350 A	03 May 2019	None	
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