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(54) **ASSEMBLY SYSTEM**

(57) An assembly system, includes: an assembly mechanism comprising a fixation device for fixing a housing and a first lead assembly mechanism and a second lead assembly mechanism provided at both sides of the fixation device, respectively, wherein the first lead assembly mechanism is adapted to insert a first lead into the housing, the second lead assembly mechanism is adapted to insert a second lead into the housing, and the first lead is inserted into the housing before the second lead. The assembly system further comprises a pressing mechanism adapted to hold the first lead inserted into

the housing at a correct installation position, so as to prevent the first lead from being offset from its correct installation position and hindering operation of inserting the second lead during inserting the second lead. The assembly system may automatically complete the task of assembling the first lead and the second lead into the housing, improving the efficiency of inserting the leads into the housing, and increasing the quality of the assembly product.

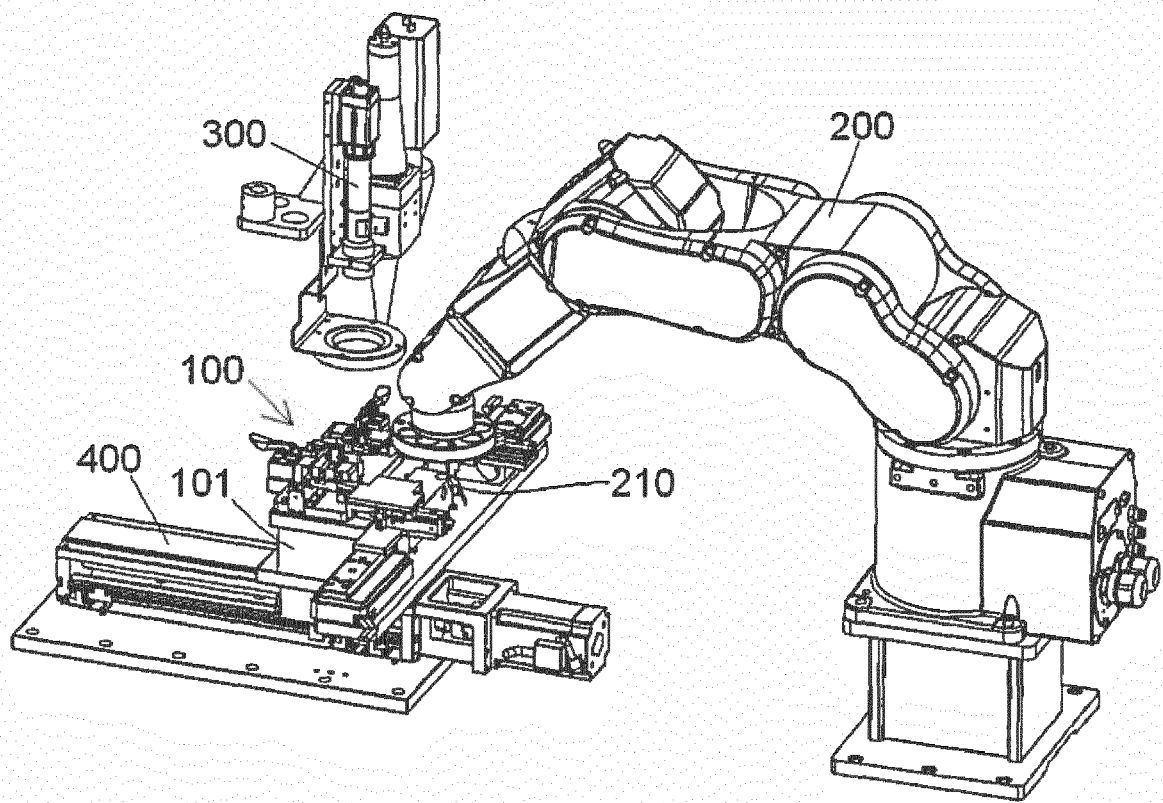


Fig. 1

Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of Chinese Patent Application No. 201711007228.3 filed on October 25, 2017 in the State Intellectual Property Office of China, the whole disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] Embodiments of the present disclosure relate to an assembly system, particularly, to an assembly system adapted to insert leads into a housing.

Description of the Related Art

[0003] In the technical field of manufacturing a connector, it is desired generally to insert a first lead and a second lead into a housing from both sides of the housing, respectively, and then to solder ends of the inserted first lead and second lead together. In order to ensure the soldering quality, the ends of the inserted first lead and second lead must be aligned and contacted with each other.

[0004] In the relevant art, the operation of inserting the first lead and the second lead is usually performed manually. Generally, the worker needs to insert the first lead into the housing, and then insert the second lead into the housing. However, during inserting the second lead, the first lead that has been inserted into the housing tends to move. This causes the inserted first lead tending to be offset from its precise installation position, and may intervene and hinder the insertion of the second lead. Thus, such an arrangement decreases the efficiency of inserting the leads, and lowers the quality of the product.

SUMMARY OF THE INVENTION

[0005] An objective of the present disclosure is to solve at least one aspect of the above mentioned problems and disadvantages occurred in the prior art.

[0006] According to an aspect of the present disclosure, there is provided an assembly system comprising an assembly mechanism. The assembly mechanism comprises a fixation device adapted to fix a housing and a first lead assembly mechanism and a second lead assembly mechanism provided at both sides of the fixation device, respectively, wherein the first lead assembly mechanism is adapted to insert a first lead into the housing, the second lead assembly mechanism is adapted to insert a second lead into the housing, and the first lead is inserted into the housing before the second lead. The assembly system further comprises a pressing mechanism adapted to hold the first lead inserted into the hous-

ing at a correct installation position, so as to prevent the first lead from being offset from the correct installation position and hindering the insertion of the second lead during inserting the second lead.

5 [0007] According to an exemplary embodiment of the present disclosure, the pressing mechanism comprises a robot and a pressing tool mounted on the robot, the robot being adapted to move the pressing tool, and the pressing tool being adapted to press and hold the first lead, in order to hold the first lead inserted into the housing at the correct installation position.

10 [0008] According to a further exemplary embodiment of the present disclosure, the pressing tool is formed with a slot matched with a shape of the first lead and adapted to hold the first lead.

15 [0009] According to a further exemplary embodiment of the present disclosure, the assembly mechanism comprises a base on which the first lead assembly mechanism, the second lead assembly mechanism and the fixation device are mounted.

20 [0010] According to a further exemplary embodiment of the present disclosure, the first lead assembly mechanism comprises a first lead clamp adapted to clamp the first lead, the first lead clamp being slidably mounted on the base and being movable in a first horizontal direction, so that the first lead that is clamped on the first lead clamp is inserted into the housing fixed on the fixation device.

25 [0011] According to a further exemplary embodiment of the present disclosure, the second lead assembly mechanism comprises a second lead clamp adapted to clamp the second lead, the second lead clamp being slidably mounted on the base and being movable in the first horizontal direction, so that the second lead that is clamped on the second lead clamp is inserted into the housing fixed on the fixation device.

30 [0012] According to another exemplary embodiment of the present disclosure, the first lead assembly mechanism further comprises: a first moving device adapted to be moved back and forth in the first horizontal direction; and a first connecting device slidably mounted on the first moving device and adapted to be moved between an engagement position and a disengagement position, wherein when the first connecting device is moved to the engagement position, the first connecting device connects the first moving device to the first lead clamp, so that the first lead clamp is moved back and forth with the first moving device in the first horizontal direction; and when the first connecting device is moved to the disengagement position, the first moving device is disengaged from the first lead clamp, so that the first lead clamp is no longer moved with the first moving device.

35 [0013] According to another exemplary embodiment of the present disclosure, the second lead assembly mechanism further comprises: a second moving device adapted to be moved back and forth in the first horizontal direction; and a second connecting device slidably mounted on the second moving device and adapted to be moved between an engagement position and a dis-

engagement position, wherein when the second connecting device is moved to the engagement position, the second connecting device connects the second moving device to the second lead clamp, so that the second lead clamp is moved back and forth with the second moving device in the first horizontal direction; and when the second connecting device is moved to the disengagement position, the second moving device is disengaged from the second lead clamp, so that the second lead clamp is no longer moved with the second moving device.

[0014] According to another exemplary embodiment of the present disclosure, the first connecting device and the second connecting device are adapted to be moved in a second horizontal direction perpendicular to the first horizontal direction.

[0015] According to another exemplary embodiment of the present disclosure, the assembly system further comprises a vision system adapted to guide the insertions of the first lead and the second lead.

[0016] According to another exemplary embodiment of the present disclosure, the vision system is further adapted to detect depths by which the first lead and the second lead are inserted into the housing.

[0017] According to another exemplary embodiment of the present disclosure, the vision system is further adapted to monitor whether the first lead and the second lead are properly inserted into the housing. When the vision system detects that the first lead or the second lead is not properly inserted into the housing, the vision system controls the assembly system to insert the first lead or the second lead again.

[0018] According to another exemplary embodiment of the present disclosure, when the vision system determines that the first lead has been properly inserted into the housing, the vision system controls the pressing mechanism to hold the first lead at the correct installation position.

[0019] According to another exemplary embodiment of the present disclosure, after the first lead and the second lead have been properly inserted into the housing, ends of the first lead and the second lead are aligned and contacted with each other.

[0020] According to another exemplary embodiment of the present disclosure, the assembly system further comprises a moving mechanism on which the assembly mechanism is mounted, the moving mechanism being adapted to move the assembly mechanism mounted thereon from a loading station to an assembly station; wherein when the assembly mechanism is at the loading station, the first lead, the second lead and the housing are loaded and fixed on the assembly mechanism; and when the assembly mechanism is at the assembly station, the assembly mechanism inserts the first lead and the second lead into the housing, respectively.

[0021] In the above exemplary embodiments of the present disclosure, a set of assembly system automatically completes the task of assembling the first lead and the second lead into the housing, improving the efficiency

of inserting the leads into the housing, and increasing the quality of the product..

[0022] Other objectives and advantages of the present disclosure will become apparent from the following description of the present disclosure when taken in conjunction with the accompanying drawings, and may give a comprehensive understanding of the present disclosure.

10 BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The above and other features of the present disclosure will become more apparent by describing in detail exemplary embodiments thereof with reference to the accompanying drawings, in which:

Fig. 1 shows an illustrative perspective view of an assembly system according to an exemplary embodiment of the present disclosure;

Fig. 2 shows an illustrative perspective view of an assembly mechanism of the assembly system as shown in Fig. 1; and

Fig. 3 shows a schematic view illustrating a pressing tool pressing and holding a first lead.

25 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0024] The technical solution of the present disclosure will be described hereinafter in further detail with reference to the following embodiments, taken in conjunction with the accompanying drawings. In the specification, the same or similar reference numerals indicate the same or similar parts. The description of the embodiments of the present disclosure hereinafter with reference to the accompanying drawings is intended to explain the general inventive concept of the present disclosure, and should not be constructed as a limitation to the present disclosure.

[0025] In addition, in the following detailed description, for the sake of explanation, numerous specific details are set forth in order to provide a thorough understanding of the disclosed embodiments. It will be apparent, however, one or more embodiments may also be practiced without these specific details. In other instances, well-known structures and devices are illustrated schematically in order to simplify the drawing.

[0026] According to a general technical concept of the present disclosure, there is provided an assembly system comprising an assembly mechanism. The assembly mechanism comprises a fixation device for fixing a housing and a first lead assembly mechanism and a second lead assembly mechanism provided at both sides of the fixation device, respectively, wherein the first lead assembly mechanism is adapted to insert a first lead into the housing, the second lead assembly mechanism is adapted to insert a second lead into the housing, and the first lead is inserted into the housing before the second

lead. The assembly system further comprises a pressing mechanism adapted to hold the first lead inserted into the housing at a correct installation position, so as to prevent the first lead from being offset from its correct installation position and hindering operation of inserting the second lead.

[0027] Fig. 1 shows an illustrative perspective view of an assembly system according to an exemplary embodiment of the present disclosure; Fig. 2 shows an illustrative perspective view of an assembly mechanism 100 of the assembly system as shown in Fig. 1; and Fig. 3 shows a schematic view illustrating a pressing tool 210 pressing and holding a first lead 10.

[0028] As shown in Figs. 1-3, in an illustrated embodiment, the assembly system mainly comprises an assembly mechanism 100 mainly comprising a fixation device 130 for fixing a housing 30, a first lead assembly mechanism 110, 111, 112 provided at one side of the fixation device 130, and a second lead assembly mechanism 120, 121, 122 provided at other side of the fixation device 130.

[0029] As shown in Figs. 1-3, in an illustrated embodiment, the first lead assembly mechanism 110, 111, 112 is adapted to insert a first lead 10 into the housing 30, the second lead assembly mechanism 120, 121, 122 is adapted to insert a second lead 20 into the housing 30, and the first lead 10 is inserted into the housing 30 before the second lead 20.

[0030] As shown in Figs. 1-3, in an illustrated embodiment, the assembly system further comprises a pressing mechanism 200, 210 adapted to hold the first lead 10 inserted into the housing 30 at a correct installation position, so as to prevent the first lead 10 from being offset from its correct installation position and hindering the insertion of the second lead 20 during inserting the second lead 20.

[0031] As shown in Figs. 1-3, in an illustrated embodiment, the pressing mechanism 200, 210 comprises a robot 200 and a pressing tool 210 mounted on the robot 200. The robot 200 is adapted to move the pressing tool 210, and the pressing tool 210 is adapted to press and hold the first lead 10, in order to hold the first lead 10 inserted into the housing 30 at its correct installation position.

[0032] As shown in Fig. 3, in an illustrated embodiment, the pressing tool 210 is formed with a slot matched with a shape of the first lead 10 and adapted to hold the first lead 10 firmly.

[0033] As shown in Figs. 1-3, in an illustrated embodiment, the assembly mechanism 100 further comprises a base 101, on which the first lead assembly mechanism 110, 111, 112, the second lead assembly mechanism 120, 121, 122 and the fixation device 130 are mounted.

[0034] As shown in Figs. 1-3, in an illustrated embodiment, the first lead assembly mechanism 110, 111, 112 comprises a first lead clamp 110 adapted to clamp the first lead 10. The first lead clamp 110 is slidably mounted on the base 101 and is movable in a first horizontal di-

rection X, so that the first lead 10 that is clamped on the first lead clamp 110 is inserted into the housing 30 fixed on the fixation device 130.

[0035] As shown in Figs. 1-3, in an illustrated embodiment, the second lead assembly mechanism 120, 121, 122 comprises a second lead clamp 120 adapted to clamp the second lead 20. The second lead clamp 120 is slidably mounted on the base 101 and is movable in the first horizontal direction X, so that the second lead 20 that is clamped on the second lead clamp 120 is inserted into the housing 30 fixed on the fixation device 130.

[0036] As shown in Figs. 1-3, in an illustrated embodiment, the first lead assembly mechanism 110, 111, 112 further comprises: a first moving device 111 adapted to be moved back and forth in the first horizontal direction X; and a first connecting device 112 slidably mounted on the first moving device 111 and adapted to be moved between an engagement position and a disengagement position. When the first connecting device 112 is moved to the engagement position, the first connecting device 112 connects the first moving device 111 to the first lead clamp 110, so that the first lead clamp 110 is moved back and forth with the first moving device 111 in the first horizontal direction X; and when the first connecting device 112 is moved to the disengagement position, the first moving device 111 is disengaged from the first lead clamp 110, so that the first lead clamp 110 is no longer moved with the first moving device 111.

[0037] As shown in Figs. 1-3, in an illustrated embodiment, the second lead assembly mechanism 120, 121, 122 further comprises: a second moving device 121 adapted to be moved back and forth in the first horizontal direction X; and a second connecting device 122 slidably mounted on the second moving device 121 and adapted to be moved between an engagement position and a disengagement position. When the second connecting device 122 is moved to the engagement position, the second connecting device 122 connects the second moving device 121 to the second lead clamp 120, so that the second lead clamp 120 is moved back and forth with the second moving device 121 in the first horizontal direction X; and when the second connecting device 122 is moved to the disengagement position, the second moving device 121 is disengaged from the second lead clamp 120, so that the second lead clamp 120 is no longer moved with the second moving device 121.

[0038] As shown in Figs. 1-3, in an illustrated embodiment, the first connecting device 112 and the second connecting device 122 are adapted to be moved in a second horizontal direction Y perpendicular to the first horizontal direction X.

[0039] In an exemplary embodiment of the present disclosure, the first moving device 111 and the second moving device 121 may comprise an electrical cylinder or a servo drive, which may be adapted to control and adjust moving speed and accelerated speed of the first moving device 111 and the second moving device 121, thereby ensuring successful insertion of the first lead 10 and the

second lead 20.

[0040] In an exemplary embodiment of the present disclosure, the motion of the first connecting device 112 or the second connecting device 122 in the second horizontal direction Y is driven by a pneumatic cylinder.

[0041] As shown in Figs. 1-3, in an illustrated embodiment, the assembly system further comprises a vision system 300 adapted to guide the insertions of the first lead 10 and the second lead 20.

[0042] As shown in Figs. 1-3, in an illustrated embodiment, the vision system 300 is also adapted to detect depths by which the first lead 10 and the second lead 20 are inserted into the housing 30, so as to ensure the inserted depths of the first lead 10 and the second lead 20 are equal to a predetermined depth.

[0043] As shown in Figs. 1-3, in an illustrated embodiment, the vision system 300 is also adapted to monitor whether the first lead 10 and the second lead 10 are properly inserted into the housing 30. When the vision system 300 detects that the first lead 10 or the second lead 20 is not properly inserted into the housing 30, the vision system 300 controls the assembly system to perform the operation of inserting the first lead 10 or the second lead 20 again.

[0044] As shown in Figs. 1-3, in an illustrated embodiment, when the vision system 300 determines that the first lead 10 has been properly inserted into the housing 30, the vision system 300 controls the pressing mechanism 200, 210 to hold the first lead 10 at its correct installation position.

[0045] As shown in Figs. 1-3, in an illustrated embodiment, after the first lead 10 and the second lead 20 have been properly inserted into the housing 30, ends of the first lead 10 and the second lead 20 are aligned and brought into contact with each other.

[0046] As shown in Figs. 1-3, in an illustrated embodiment, the assembly system further comprises a moving mechanism 400 adapted to be moved in the second horizontal direction Y. The assembly mechanism 100 is mounted on the moving mechanism 400. The moving mechanism 400 is adapted to move the assembly mechanism 100 mounted thereon from a loading station to an assembly station. When the assembly mechanism 100 is at the loading station, the first lead 10, the second lead 20 and the housing 30 are loaded and fixed on the assembly mechanism 100; and when the assembly mechanism 100 is at the assembly station, the assembly mechanism 100 inserts the first lead 10 and the second lead 20 into the housing 30, respectively.

[0047] It should be appreciated by those skilled in the art that the above embodiments are intended to be illustrative, modifications may be made to the above embodiments by those skilled in the art, and structures described in various embodiments may be freely combined without having structural and principle conflict.

[0048] Although the present disclosure has been described with reference to the attached drawings, the embodiments disclosed in the drawings are intended to il-

lustrate the preferred embodiments of the present disclosure, but should not be constructed as a limitation to the present disclosure.

[0049] Although some embodiments of the general concept of the present disclosure has been shown and described, it would be appreciated by those skilled in the art that modifications may be made to these embodiments without departing from the principle and spirit of the present disclosure, the scope of which is defined in the claims and their equivalents.

[0050] It should be noted that term "comprising" or "including" should be understood as not excluding other elements or steps, and term "a" or "an" should be understood as not excluding plural elements or steps. Further, any reference numerals in claims should not be understood as a limitation to the present disclosure.

Claims

1. An assembly system, comprising:

an assembly mechanism (100) comprising a fixation device (130) adapted to fix a housing (30) and a first lead assembly mechanism (110, 111, 112) and a second lead assembly mechanism (120, 121, 122) provided at both sides of the fixation device (130), respectively, the first lead assembly mechanism (110, 111, 112) being adapted to insert a first lead (10) into the housing (30), the second lead assembly mechanism (120, 121, 122) being adapted to insert a second lead (20) into the housing (30), and the first lead (10) being inserted into the housing (30) before the second lead (20), **characterized in that**, the assembly system further comprises a pressing mechanism (200, 210) adapted to hold the first lead (10) inserted into the housing (30) at a correct installation position, so as to prevent the first lead (10) from being offset from the correct installation position and hindering operation of inserting of the second lead (20).

2. The assembly system according to claim 1, wherein, the pressing mechanism (200, 210) comprises a robot (200) and a pressing tool (210) mounted on the robot (200), the robot (200) being adapted to move the pressing tool (210), and the pressing tool (210) being adapted to press and hold the first lead (10), in order to hold the first lead (10) inserted into the housing (30) at the correct installation position.

3. The assembly system according to claim 2, wherein, the pressing tool (210) is formed with a slot matched with a shape of the first lead (10) and adapted to hold the first lead (10).

4. The assembly system according to claim 1, wherein, the assembly mechanism (100) comprises a base (101) on which the first lead assembly mechanism, the second lead assembly mechanism and the fixation device are mounted. 5
5. The assembly system according to claim 4, wherein, the first lead assembly mechanism (110, 111, 112) comprises a first lead clamp (110) adapted to clamp the first lead (10), the first lead clamp (110) being slidably mounted on the base (101) and being movable in a first horizontal direction (X), so that the first lead (10) that is clamped on the first lead clamp (110) is inserted into the housing (30) fixed on the fixation device (130). 10 15
6. The assembly system according to claim 5, wherein, the second lead assembly mechanism (120, 121, 122) comprises a second lead clamp (120) adapted to clamp the second lead (20), the second lead clamp (120) being slidably mounted on the base (101) and being movable in the first horizontal direction (X), so that the second lead (20) that is clamped on the second lead clamp (120) is inserted into the housing (30) fixed on the fixation device (130). 20 25
7. The assembly system according to claim 6, wherein, the first lead assembly mechanism (110, 111, 112) further comprises: 30
 - a first moving device (111) adapted to be moved back and forth in the first horizontal direction (X); and
 - a first connecting device (112) slidably mounted on the first moving device (111) and adapted to be moved between an engagement position and a disengagement position, wherein when the first connecting device (112) is moved to the engagement position, the first connecting device (112) connects the first moving device (111) to the first lead clamp (110), so that the first lead clamp (110) is moved back and forth with the first moving device (111) in the first horizontal direction (X); and 40
 - when the first connecting device (112) is moved to the disengagement position, the first moving device (111) is disengaged from the first lead clamp (110), so that the first lead clamp (110) is no longer moved with the first moving device (111). 45 50
8. The assembly system according to claim 7, wherein, the second lead assembly mechanism (120, 121, 122) further comprises: 55
 - a second moving device (121) adapted to be moved back and forth in the first horizontal direction (X); and
 - a second connecting device (122) slidably mounted on the second moving device (121) and adapted to be moved between an engagement position and a disengagement position, wherein when the second connecting device (122) is moved to the engagement position, the second connecting device (122) connects the second moving device (121) to the second lead clamp (120), so that the second lead clamp (120) is moved back and forth with the second moving device (121) in the first horizontal direction (X); and
 - when the second connecting device (122) is moved to the disengagement position, the second moving device (121) is disengaged from the second lead clamp (120), so that the second lead clamp (120) is no longer moved with the second moving device (121).
9. The assembly system according to claim 8, wherein, the first connecting device (112) and the second connecting device (122) are adapted to be moved in a second horizontal direction (Y) perpendicular to the first horizontal direction (X).
10. The assembly system according to claim 1, wherein, the assembly system further comprises a vision system (300) adapted to guide the insertions of the first lead (10) and the second lead (20).
11. The assembly system according to claim 10, wherein, the vision system (300) is further adapted to detect depths by which the first lead (10) and the second lead (20) are inserted into the housing (30).
12. The assembly system according to claim 10, wherein, the vision system (300) is further adapted to monitor whether the first lead (10) and the second lead (20) are properly inserted into the housing; and wherein when the vision system (300) detects that the first lead (10) or the second lead (20) is not properly inserted into the housing (30), the vision system (300) controls the assembly system to perform the operation of inserting the first lead (10) or the second lead (20) again.
13. The assembly system according to claim 12, wherein, when the vision system (300) determines that the first lead (10) has been properly inserted into the housing (30), the vision system (300) controls the pressing mechanism (200, 210) to hold the first lead (10) at the correct installation position.
14. The assembly system according to claim 1, wherein, after the first lead (10) and the second lead (20) have

been properly inserted into the housing (30), ends of the first lead (10) and the second lead (20) are aligned and brought into contact with each other.

15. The assembly system according to claim 1, wherein, 5
the assembly system further comprises a moving
mechanism (400) on which the assembly mecha-
nism (100) is mounted, the moving mechanism (400)
being adapted to move the assembly mechanism
(100) mounted thereon from a loading station to an 10
assembly station;
wherein when the assembly mechanism (100) is at
the loading station, the first lead (10), the second
lead (20) and the housing (30) are loaded and fixed
on the assembly mechanism (100); and 15
when the assembly mechanism (100) is at the as-
sembly station, the assembly mechanism (100) in-
serts the first lead (10) and the second lead (20) into
the housing (30), respectively.

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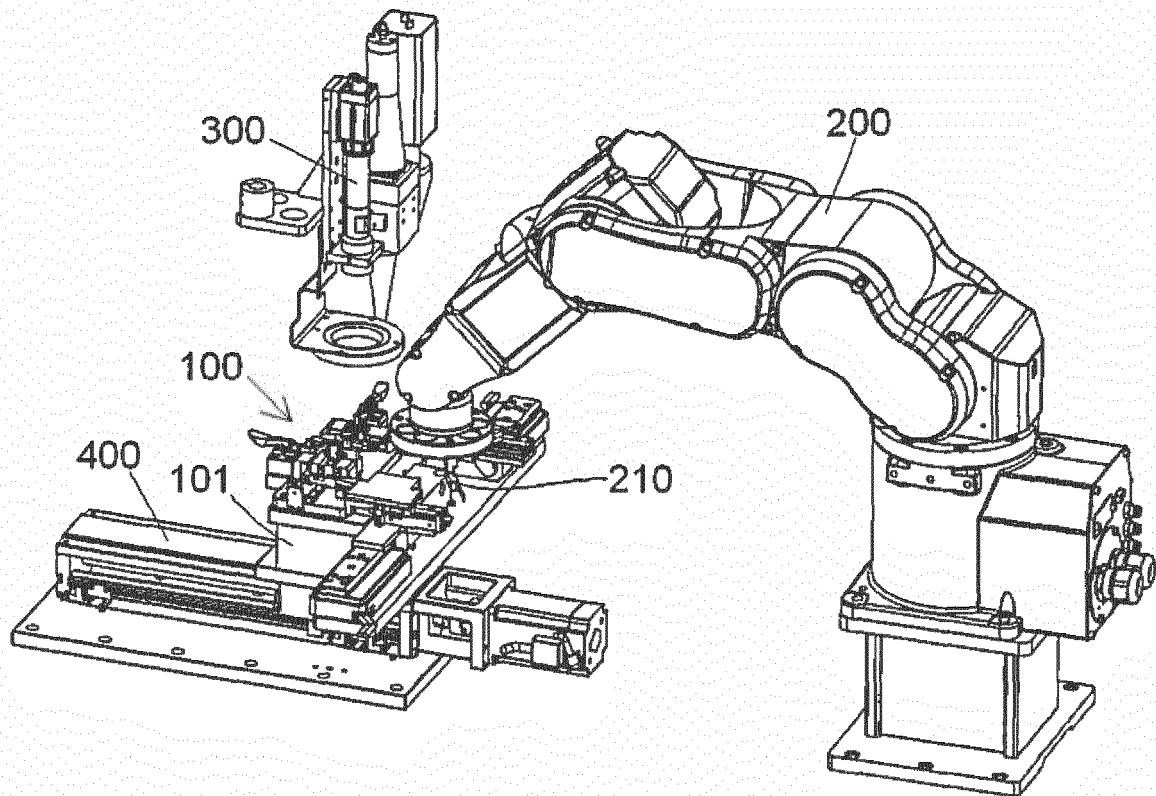
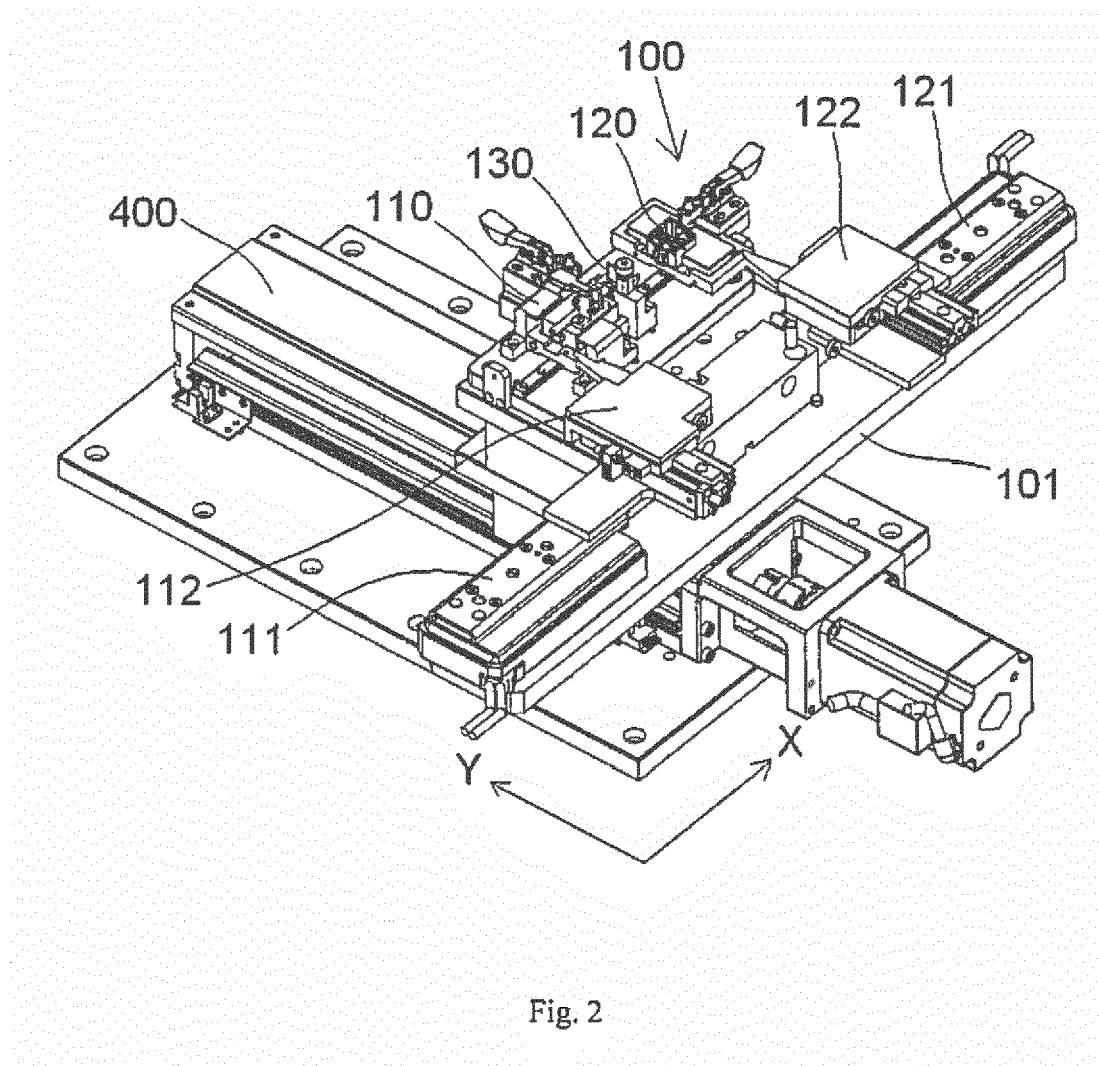
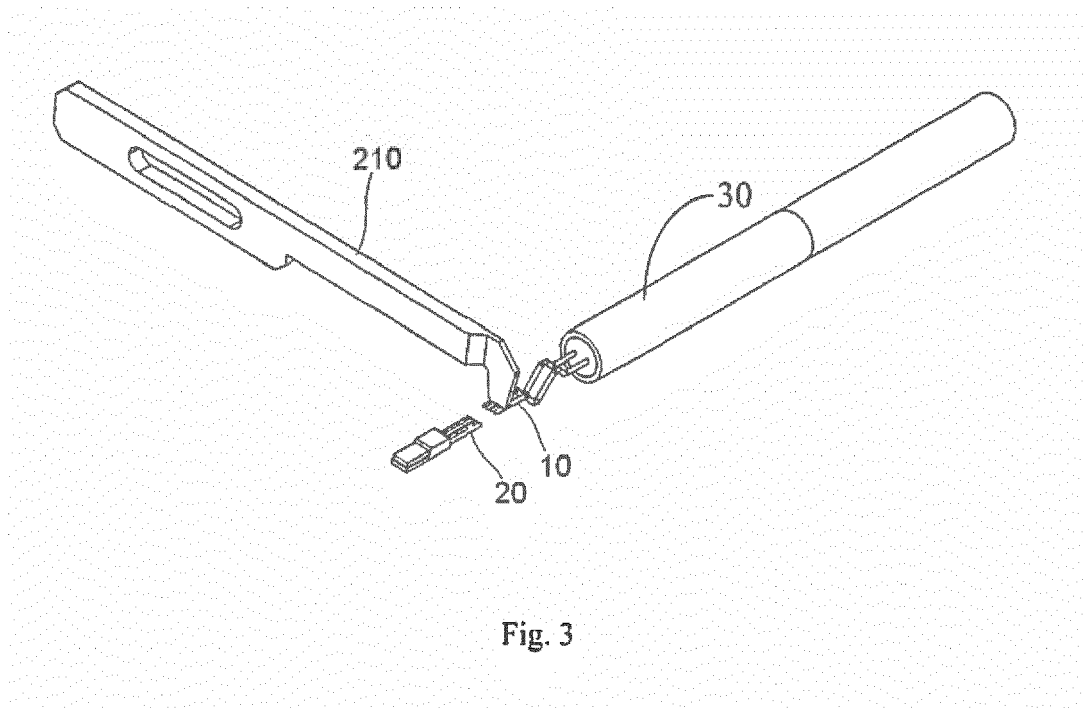


Fig. 1







EUROPEAN SEARCH REPORT

Application Number
EP 18 20 2092

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 236 563 A1 (HIRSCHMANN AUSTRIA GMBH [AT]) 4 September 2002 (2002-09-04)	1,3,5,6,14	INV. H01R43/20
Y	* paragraph [0017] - paragraph [0026]; figures 1-7 *	10-13	H01R43/02
Y	US 4 910 859 A (HOLCOMB GREGORY W [US]) 27 March 1990 (1990-03-27) * column 5, line 10 - column 24, line 46; figures 1-36A *	2,4,7-9,15	
Y	EP 1 619 759 A1 (SAINT GOBAIN [FR]; DELPHI TECH INC [US]) 25 January 2006 (2006-01-25) * paragraph [0031]; figure 2 *	10-13	
Y	CN 105 817 851 A (TYCO ELECTRONICS (SHANGHAI) CO LTD; TYCO ELECTRONICS CORP) 3 August 2016 (2016-08-03) * abstract; figures 1-3 *	2,4,7-13,15	
A	US 2014/109385 A1 (LU ROBERTO FRANCISCO-YI [US] ET AL) 24 April 2014 (2014-04-24) * paragraph [0020] - paragraph [0053]; figures 1-13 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) H01R
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 15 February 2019	Examiner Oliveira Braga K., A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

 1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 20 2092

5

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1236563 A1	04-09-2002	AT 312702 T EP 1236563 A1	15-12-2005 04-09-2002
US 4910859 A	27-03-1990	NONE	
EP 1619759 A1	25-01-2006	AT 349785 T DE 102004034804 A1 EP 1619759 A1 ES 2279468 T3	15-01-2007 16-03-2006 25-01-2006 16-08-2007
CN 105817851 A	03-08-2016	NONE	
US 2014109385 A1	24-04-2014	CN 104838548 A MX 345438 B TW 201424176 A US 2014109385 A1 WO 2014066343 A1	12-08-2015 31-01-2017 16-06-2014 24-04-2014 01-05-2014

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 201711007228 [0001]