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(54) **ELECTROPLATING ASSEMBLY MECHANISM**

(57) An electroplating assembly mechanism comprises an electroplating drum (3). The electroplating drum (3) has a circular drum body (31), a rotary shaft (32), an engagement portion (33), and a plurality of vortex blades (37). A first end (321) of the rotary shaft (32) is provided at the circular drum body (31). The engagement portion (33) is provided at a bottom portion of the circular drum body (31), and is driven to rotate by a driving device. The vortex blades (37) are provided at the bottom portion of the circular drum body (31).

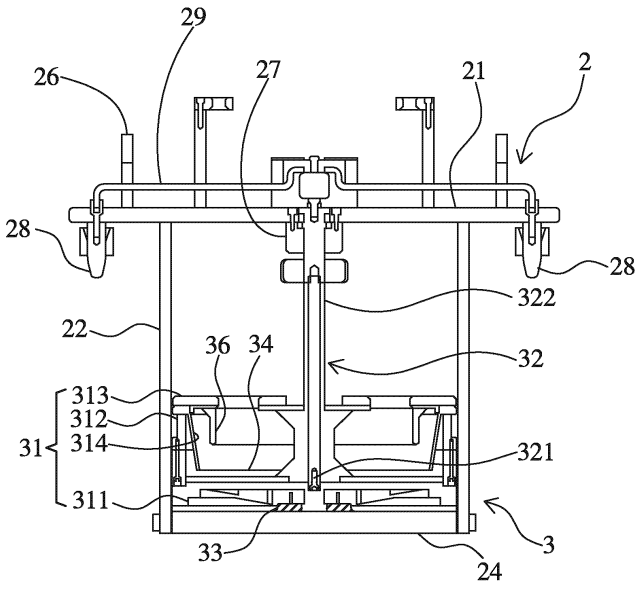

FIG. 1

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Description

FIELD OF INVENTION

[0001] The present disclosure relates to an electroplating assembly mechanism, and in particular, relates to an electroplating assembly mechanism used for electroplating or electroless plating of many small components.

BACKGROUND OF INVENTION

[0002] Usually, there are two ways of plating, one is hanging plating and the other is barrel plating. Hanging plating is a plating method in which components are mounted on a hanger for plating deposition, and is generally used for plating of large-sized components. For small components that are incapable or unsuitable for hanging, due to factors, such as shapes and sizes, barrel plating is generally used. Barrel plating, also known as roller plating, is to place a certain number of small components in a specific roller, and to deposit various metal or alloy coatings on the surface of the components in an indirect conductive manner in a rolling state of the specific roller, thereby achieve surface protection, decoration, or functional purposes. Compared with the hanging plating, the barrel plating process which the components undergo greatly changes. The hanging plating is performed in a state where the components are separately packaged, and the barrel plating is performed in a state in which the components sometimes gather and sometimes separate. In this process, a mixing cycle of the components is generated. In addition, the hanging plating is performed while the components are completely exposed, and the barrel plating is carried out in a low concentration solution in a closed barrel (although there are holes in the wall). The change in the process the components are plated results in two major defects in the barrel plating, namely the defects caused by the mixing cycle and the structural defects of the barrel plating. The above defects have a serious impact on the production efficiency of the barrel plating and the improvement of the product quality, so that the superiority of the barrel plating cannot be fully exerted.

[0003] Furthermore, in the current barrel plating technique, the roller connects a driving device. After the components to be plated are loaded in the roller, the roller is placed in a plating tank and the driving device is activated, so that the components to be plated are turned over, thereby facilitating the contact of the electroplating solution with the components to produce an electrochemical effect. Plating the surface of needle-like or flaky microelectronic components is usually carried out in a plating roller. There are many kinds of plating rollers in the prior art. Most of the plating rollers are driven by horizontal driving devices. These plating rollers generally have problems of complicated structures, difficulty in solution replacement, low plating efficiency, and high maintenance costs.

[0004] In addition, there is also a plating roller disposed at a lower end of a drive shaft for enabling the electroplating tank provided with the anode to be rotationally driven. The centrifugal force is applied when the plating roller is rotationally driven, so that the electroplating solution flows out from the inside of the plating roller to the outside, and then the electroplating solution flows into the inside from the outside. However, the plating roller is fixed at the lower end of the drive shaft and cannot be shifted and replaced. Therefore, the plating process enabling the automatic shifting and the tank replacement cannot be achieved.

[0005] As a result, it is necessary to provide an electroplating assembly mechanism to solve the problems existing in the conventional technologies, as described above.

SUMMARY OF INVENTION

[0006] An object of the present disclosure is to provide an electroplating assembly mechanism, wherein the vortex blades are used to form a vortex on the electroplating solution in a circular drum body, so that the electroplating solution is quickly exchanged. The flow direction of the plating solution is stabilized by a wire conductive ring, so that the plating solution may evenly immerse the small components, and the effect of uniform electroplating on the surface of the small components is achieved.

[0007] To achieve the above objects, the present disclosure provides an electroplating assembly mechanism for electroplating a plurality of small components. The electroplating assembly mechanism comprises an electroplating drum configured to carry the small components, wherein the electroplating drum includes a circular drum body, a rotary shaft, an engagement portion, and a plurality of vortex blades, wherein a first end of the rotary shaft is disposed on the circular drum body, the engagement portion is disposed at a bottom of the circular drum body and configured to be driven by a drive, and the vortex blades is disposed at the bottom of the circular drum body.

[0008] In one embodiment of the present disclosure, the electroplating assembly mechanism further comprises a moving rack, the electroplating drum is assembled on the moving rack, and the moving rack comprises a fixing plate, two side plates, two auxiliary rods, and a rotary joint, wherein the two side plates are assembled on two side of the fixing plate, the two auxiliary rods are disposed between the side plates, the circular drum body is located above the auxiliary rods, and the rotary joint is pivotally connected to the fixing plate for assembling with a second end of the rotary shaft.

[0009] In one embodiment of the present disclosure, the fixing plate further comprises two cathode bases arranged on two side of a bottom of the fixing plate, respectively, and used for electrical connection with a cathode ring.

[0010] In one embodiment of the present disclosure,

the fixing plate further comprises a cathode wire connected to the two cathode bases for electrical connection with the cathode ring.

[0011] In one embodiment of the present disclosure, the circular drum body includes a base, a surrounding wall, an upper cover, and a cathode ring, wherein the base is assembled with the surrounding wall, the upper cover covers the surrounding wall to form an internal space, the rotary shaft is connected to the upper cover and extends outward from the base, and the cathode ring is disposed in the surrounding wall.

[0012] In one embodiment of the present disclosure, the electroplating drum further comprises a wire conductive ring disposed in the circular drum body and spaced from the surrounding wall.

[0013] In one embodiment of the present disclosure, the electroplating drum further comprises a current transmission layer disposed on a base of the circular drum body.

[0014] In one embodiment of the present disclosure, the circular drum body further comprises a plurality of cathode plates and a plurality of tortuous slopes, wherein the cathode plates and the tortuous slope are alternately arranged on the current transmission layer, and the cathode plate is located between two adjacent tortuous slopes.

[0015] As described above, the cathode ring located on the surrounding wall of the circular drum body may be electrically connected to the two cathode bases through the rotating shaft and the cathode wire. When the electroplating drum starts to rotate to generate centrifugal force, the small components in the circular drum body are driven toward the cathode ring. At the same time, the vortex blades cause the plating solution in the circular drum body to form a vortex, and the plating solution is quickly exchanged. The design of the wire conductive ring may stabilize the flow direction of the plating solution, so that the plating solution may evenly immerse the small components, and achieve the effect of uniform electroplating on the surface of the small components.

DESCRIPTION OF DRAWINGS

[0016]

FIG. 1 is a cross-sectional view of an electroplating assembly according to a preferred embodiment of the present disclosure.

FIG. 2 is an exploded view of an electroplating assembly according to a preferred embodiment of the present disclosure.

FIG. 3 is an exploded view of an electroplating assembly according to another preferred embodiment of the present disclosure.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0017] The structure and the technical means adopted by the present disclosure to achieve the above and other objects can be best understood by referring to the following detailed description of the preferred embodiments and the accompanying drawings. Furthermore, directional terms described by the present disclosure, such as upper, lower, front, back, left, right, inner, outer, side, longitudinal/vertical, transverse/horizontal, etc., are only directions by referring to the accompanying drawings, and thus the used directional terms are used to describe and understand the present disclosure, but the present disclosure is not limited thereto.

[0018] Referring to FIG. 1 and FIG. 2, an electroplating assembly mechanism according to a preferred embodiment of the present disclosure is illustrated to carrying a plurality of small components for electroplating or electroless plating, wherein small components are, for example, chip type resistors, inductors, capacitors, connectors, precision parts, etc. The electroplating assembly mechanism includes a moving rack 2 and an electroplating drum 3. The detailed structure of each component, assembly relationships, and principle of operation in the present invention will be described in detail hereinafter.

[0019] Referring to FIG. 1 and FIG. 2, the moving rack 2 includes a fixing plate 21, two side plates 22, two auxiliary rods 24, two grips 26, a rotary joint 27, two cathode bases 28, and a cathode wire 29, wherein the two side plates 22 are assembled on two side of the fixing plate 21, the two auxiliary rods 24 are disposed between the side plates 22, the two grips 26 are arranged on two sides of a top surface of the fixing plate 21 at intervals and configured to be held and moved, the rotary joint 27 is pivotally connected to the fixing plate 21 for assembling with a second end 322 of the rotary shaft 32, the two cathode bases 28 are arranged on two side of a bottom of the fixing plate 21, respectively, and the cathode wire 29 is connected to the two cathode bases 28.

[0020] Referring to FIG. 1 and FIG. 2, the electroplating drum 3 is configured to carry the small components (not shown), and the electroplating drum 3 may be assembled on the moving rack 2. The electroplating drum 3 includes a circular drum body 31, a rotary shaft 32, an engagement portion 33, a current transmission layer 34, a wire conductive ring 36, and a plurality of vortex blades 37, wherein a first end 321 of the rotary shaft 32 is disposed on the circular drum body 31, the engagement portion 33 is located below the first end 321, and the vortex blades 37 are arranged on a plate body 38 at intervals around the rotary shaft 32. Furthermore, the engagement portion 33 is disposed at a bottom of the circular drum body 31, wherein one end surface of the second end 322 is shaped like a jaw, and the two auxiliary rods are disposed between the side plates 22 so that the circular drum body 31 is located above the two auxiliary rods 24. It should be noted that the engagement portion 33 is used to mount

a driver (not shown), and driven by a driving wheel of the driver to rotate.

[0021] It should be note that the current transmission layer 34 is made of titanium metal, titanium plated material or titanium sprayed material. The circular drum body 31 is made of plastic material. An intermediate layer (not shown) is provided between the current transmission layer 34 and the circular drum body 31, and the intermediate layer is made of plastic material.

[0022] Referring to FIG. 1 and FIG. 2, the circular drum body 31 includes a base 311, a surrounding wall 312, an upper cover 313, and a cathode ring 314, wherein the base 311 is assembled with the surrounding wall 312, the upper cover 313 covers the surrounding wall 312 to form an internal space (not shown), the internal space is configured to accommodate the small components, the rotary shaft 32 is connected to the upper 313 cover and extends outward from the base 311, the cathode ring 314 is disposed on an inner surface of the surrounding wall 312, and the cathode wire 29 may be electrically connected with the cathode ring 314 through the rotary shaft 32. Furthermore, the plate body 38 is assembled on the base 311 so that the vortex blades 37 are located above the base 311.

[0023] According to the above structure, by releasing the rotary joint 27, the circular drum body 31 and the rotary shaft 32 may be detached from the moving rack 2. When contacting and energizing, the two cathode bases 28 on the two sides of the bottom of the fixing plate 21 may be electrically connected to the cathode ring 314. When the fixing plate 21 is moved away, a power failure is formed. Furthermore, when the rotation of the cathode ring 314 accelerates to a specified speed, the small components (electroplate) in the circular drum body 31 are closely attached to the cathode ring 314 due to centrifugal force, and are electroplated by supplying power. After a period of time, the power is turned off and the cathode ring 314 is decelerated to a low speed, and the small components (electroplate) in the circular drum body 31 are mixed due to gravity falling on the bottom of the circular drum body 31. Then, after the small components (electroplate) are mixed, the cathode ring 314 is rotated and accelerated to a specified rotation speed. In this way, the small components (electroplate) are mixed at low speed, and electroplating is accelerated, and then mixed at low speed, and the electroplating is accelerated again, so that the surface of the small components (electroplate) may have more uniform electroplating effect.

[0024] As the above design, the cathode ring 314 located on the surrounding wall 312 of the circular drum body 31 may be electrically connected to the two cathode bases 28 through the rotating shaft 32 and the cathode wire 29. When the electroplating drum 3 starts to rotate to generate centrifugal force, the small components in the circular drum body 31 are driven toward the cathode ring 314. At the same time, the vortex blades 37 cause the plating solution in the circular drum body 31 to form a vortex, and the plating solution is quickly exchanged. The design of the wire conductive ring 36 may stabilize the flow direction of the plating solution, so that the plating solution may evenly immerse the small components, and achieve the effect of uniform electroplating on the surface of the small components.

[0025] Further, through the design of the engagement portion 33, the engagement portion 33 may be easily engaged with the driver and driven by the driver to rotate. Moreover, through the design of the rotary joint 27, the electroplating drum 3 may be easily installed on or removed from the moving rack 2, and it is possible to shorten the removal speed of the electroplating drum 3 and improve the efficiency of the electroplating operation. Furthermore, the engaging portion 33 is driven to rotate the circular drum body 31, and the centrifugal force at the time of rotation causes the small components in the circular drum body 31 to be moved towards the cathode ring 314 to cause the small components can move and roll efficiently in the plating solution.

[0026] Referring to FIG. 3, another embodiment of the electroplating assembly mechanism of the present disclosure is illustrated, wherein the same component names and reference numbers are generally used as the above embodiment. The differences between the two embodiments are that: the circular drum body 31 includes a plurality of cathode plates 317 and a plurality of tortuous slopes 318, wherein the cathode plates 317 and the tortuous slopes 318 are alternately arranged on the current transmission layer 34, and the cathode plate 317 is located between two adjacent tortuous slopes 318. Therefore, this embodiment may also make the electroplating drum 3 easily be moved and replaced, and can achieve the effect of uniformly electroplating on the surface of the small components according to the needs of different types of small components to be electroplated.

[0027] As described above, the cathode ring 314 located on the surrounding wall 312 of the circular drum body 31 may be electrically connected to the two cathode bases 28 through the rotating shaft 32 and the cathode wire 29. When the electroplating drum 3 starts to rotate to generate centrifugal force, the small components in the circular drum body 31 are driven toward the cathode ring 314. At the same time, the vortex blades 37 cause the plating solution in the circular drum body 31 to form a vortex, and the plating solution is quickly exchanged. The design of the wire conductive ring 36 may stabilize the flow direction of the plating solution, so that the plating solution may evenly immerse the small components, and achieve the effect of uniform electroplating on the surface of the small components.

[0028] The present disclosure has been described with preferred embodiments thereof and it is understood that many changes and modifications to the described embodiments can be carried out without departing from the scope and the spirit of the invention that is intended to be limited only by the appended claims.

Claims

1. An electroplating assembly mechanism for electroplating a plurality of small components, **characterized in that** the electroplating assembly mechanism comprises:
an electroplating drum (3) configured to carry the small components, wherein the electroplating drum (3) includes:

a circular drum body (31);
a rotary shaft (32), wherein a first end (321) of the rotary shaft (32) is disposed on the circular drum body (31);
an engagement portion (33) disposed at a bottom of the circular drum body (31) and configured to be driven by a drive; and
a plurality of vortex blades (37) disposed at the bottom of the circular drum body (31).

2. The electroplating assembly mechanism according to claim 1, **characterized in that** the electroplating assembly mechanism further comprises a moving rack (2), the electroplating drum (3) is assembled on the moving rack (2), and the moving rack (2) comprises:

a fixing plate (21);
two side plates (22) assembled on two side of the fixing plate (21);
two auxiliary rods (24) disposed between the side plates (22), wherein the circular drum body (31) is located above the auxiliary rods (24); and
a rotary joint (27) pivotally connected to the fixing plate (21) for assembling with a second end (322) of the rotary shaft (32).

3. The electroplating assembly mechanism according to claim 2, **characterized in that** the fixing plate (21) further comprises two cathode bases (28) arranged on two side of a bottom of the fixing plate (21), respectively, and used for electrical connection with a cathode ring (314).

4. The electroplating assembly mechanism according to claim 3, **characterized in that** the fixing plate (21) further comprises a cathode wire (29) connected to the two cathode bases (28) for electrical connection with the cathode ring (314).

5. The electroplating assembly mechanism according to claim 1, **characterized in that** the circular drum body (31) includes a base (311), a surrounding wall (312), an upper cover (313), and a cathode ring (314), wherein the base (311) is assembled with the surrounding wall (312), the upper cover (313) covers the surrounding wall (312) to form an internal space, the rotary shaft (32) is connected to the upper (313) cover and extends outward from the base (311), and the cathode ring (314) is disposed in the surrounding wall (312).

6. The electroplating assembly mechanism according to claim 5, **characterized in that** the electroplating drum (3) further comprises a wire conductive ring (36) disposed in the circular drum body (31) and spaced from the surrounding wall (312).

7. The electroplating assembly mechanism according to claim 1, **characterized in that** the electroplating drum (3) further comprises a current transmission layer (34) disposed on a base (311) of the circular drum body (31).

8. The electroplating assembly mechanism according to claim 7, **characterized in that** the circular drum body (31) further comprises a plurality of cathode plates (317) and a plurality of tortuous slopes (318), wherein the cathode plates (317) and the tortuous slopes (318) are alternately arranged on the current transmission layer (34), and the cathode plate (317) is located between two adjacent tortuous slopes (318).

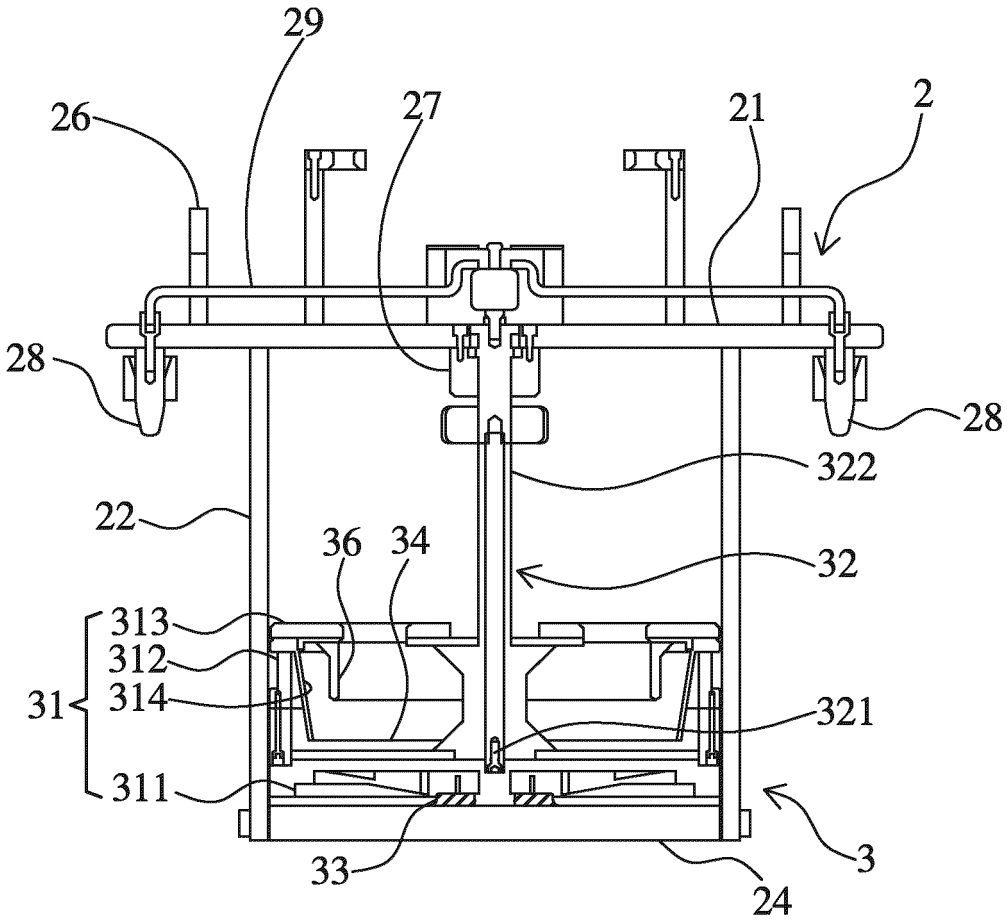

FIG. 1

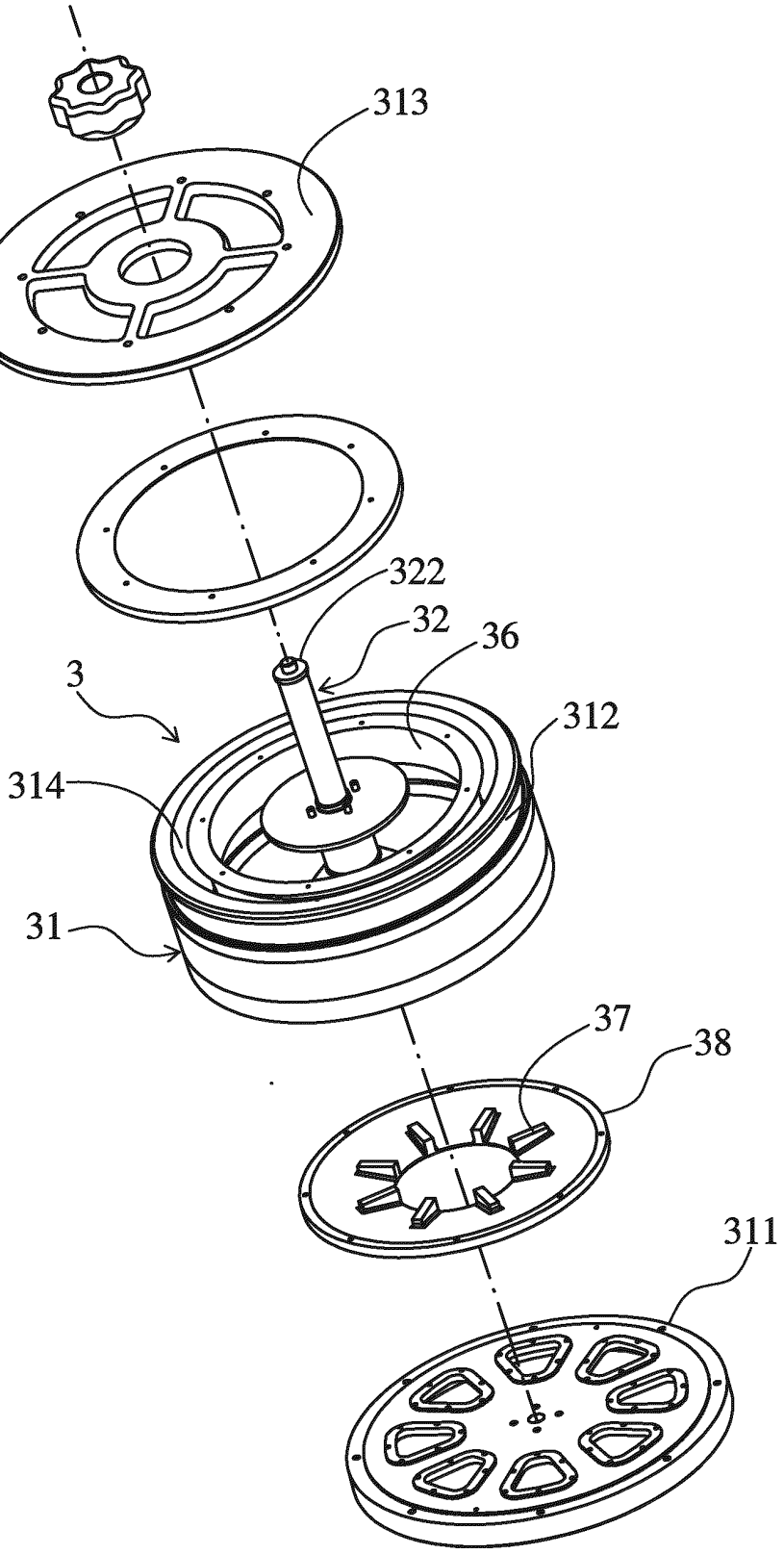

FIG. 2

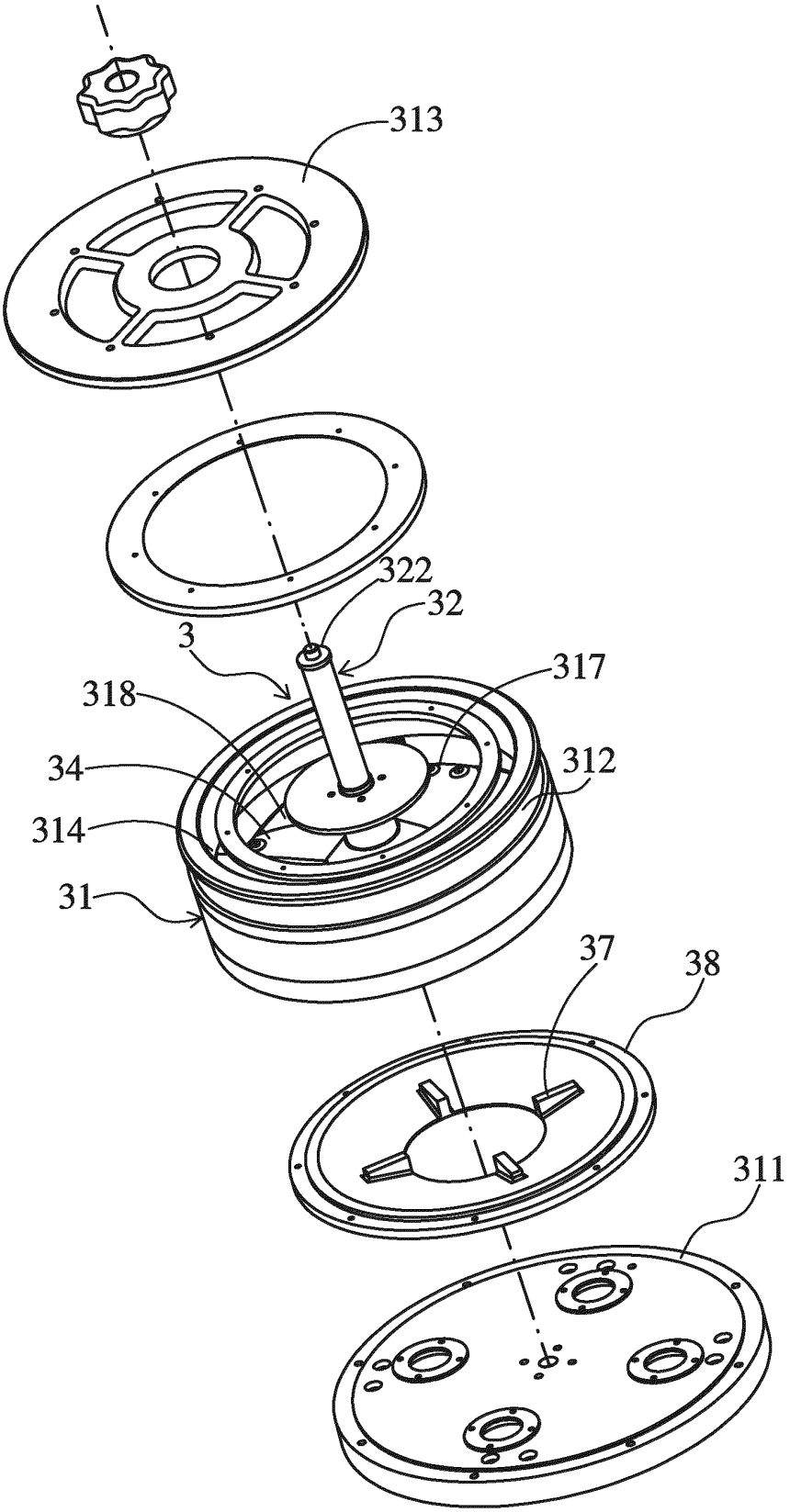

FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/118619

A. CLASSIFICATION OF SUBJECT MATTER

C25D 17/18(2006.01)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)

C25D

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)

CNPAT, CNKI, EPODOC, WPI: 汉玛科技股份有限公司, 黄博道, 刘耀崇, 电镀, 滚镀, 滚筒, 转轴, 卡, 离心, 重力, 涡流, 叶片, 接头, 效率, 均匀, 置换, 替换, 阴极, 阳极, electrolyte, plating, coating, barrel, bulk, container, locking, centrifugal, gravity, whirlpool, vortex, vane, connector, efficiency, uniformity, replacement, cathode, anode.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3359195 A (HOJYO, K.) 19 December 1967 (1967-12-19) description, columns 1-2, and figures 1-2	1, 5-8
A	CN 101139732 A (UYEMURA & CO., LTD.) 12 March 2008 (2008-03-12) entire document	1-8
A	CN 102277613 A (HITACHI METALS, LTD.) 14 December 2011 (2011-12-14) entire document	1-8
A	JP 5672717 B2 (TDK CORPORATION) 18 February 2015 (2015-02-18) entire document	1-8
A	JP 2009065005 A (PANASONIC CORP.) 26 March 2009 (2009-03-26) entire document	1-8
A	JP H11279800 A (HITACHI METALS, LTD.) 12 October 1999 (1999-10-12) entire document	1-8
A	CN 106884198 A (LIN, CHUNFANG) 23 June 2017 (2017-06-23) entire document	1-8

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 August 2018	**19 September 2018**

Name and mailing address of the ISA/CN	Authorized officer
State Intellectual Property Office of the P. R. China **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing** **100088** **China**	
Facsimile No. **(86-10)62019451**	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/118619

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
US	3359195	A	19 December 1967	None			
CN	101139732	A	12 March 2008	KR	20080005075	A	10 January 2008
				JP	2008013815	A	24 January 2008
				TW	200827495	A	01 July 2008
				US	2008006527	A1	10 January 2008
				CN	102002750	A	06 April 2011
CN	102277613	A	14 December 2011	JP	2011256420	A	22 December 2011
JP	5672717	B2	18 February 2015	None			
JP	2009065005	A	26 March 2009	None			
JP	H11279800	A	12 October 1999	None			
CN	106884198	A	23 June 2017	None			

Form PCT/ISA/210 (patent family annex) (January 2015)