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(54) **AUTO STRAPPING PACKAGING TOOL HAVING CLAMP FIXING APPARATUS**

(57) Provided is an auto strapping packaging tool having a clamp fixing apparatus including a body assembly, a tension module partially coupled to the body assembly and providing a tensile force to a plastic band using a first motor, a feed wheel part rotated by the first motor about a first shaft, and a clamp part disposed around the feed wheel part to be rotated about a second shaft, a welding module including a second motor and a

third motor and providing a friction force to the plastic band to which the tensile force is applied by the tension module, a hooking part provided with a first hooking element axially rotatably disposed in the body assembly and a second hooking element fixedly disposed in the body assembly, and a lever unit axially rotatably coupled to the body assembly.

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Description

[0001] This application claims priority to and the benefit of Korean Patent Application No. 10-2021-0006578, filed on 18 01 2021, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

1. Field of the Invention

[0002] The present invention relates to an auto strapping packaging tool, and more particularly, to an auto strapping packaging tool used when packaging goods and the like using a plastic band.

2. Discussion of Related Art

[0003] Auto strapping packaging tools have portable tool types and are used to package goods such as boxes using plastic bands. Packaging is performed by wrapping goods using a plastic band to form a loop and tightening the plastic band using an auto packaging tool until a predetermined magnitude of tension is generated on the loop. Then, a subsequent process is performed by bonding portions of the plastic band which overlaps itself in two layers. In this case, the bonding is mainly performed by using friction heat generated by vibrating the plastic band in a state in which the plastic band is pressed. Accordingly, solid bonding between homogeneous materials is performed on the plastic band in a locally molten state. Then, when the bonded portions are cooled, a solid loop is formed.

[0004] In the conventional auto strapping packaging tool, there is cumbersomeness in continuously maintaining a state, in which a clamp is spaced apart from a feed wheel by a predetermined distance, in a process of wrapping a plastic band, which is a first operation of strapping. Therefore, it is inconvenient for a user to work, and when the work lasts for a long time, there is a problem of reducing work convenience.

[0005] In addition, one cylindrical brushless direct current (BLDC) motor is disposed and controlled in the conventional strapping packaging tool. Accordingly, since an internal structure becomes complex and high vibration is transmitted to other apparatuses in a welding process, there is a problem of badly affecting the durability of internal components. In addition, since a layout of the components is limited due to the long cylindrical BLDC motor, an unbalance occurs in the overall weight distribution, and thus inconvenience is raised in terms of usability.

[Prior Art]

[Patent Document]

[0006]

(Patent Document 1) Korean Patent Registration No. 10-1675003 (registered on Nov 4, 2016) "STRAPPING DEVICE WITH A GEAR SYSTEM DEVICE"
(Patent Document 2) Korean Patent Registration No. 10-1613247 (registered on Apr 11, 2016) "STRAPPING DEVICE WITH A TENSIONER"
(Patent Document 3) Korean Patent Publication No. 10-2019-0034662 (published on Apr 2, 2019) "STRAPPING APPARATUS"

SUMMARY OF THE INVENTION

[0007] The present invention is directed to providing an auto strapping packaging tool having a clamp fixing apparatus which has an open mode and a closed mode. In addition, the present invention is directed to providing a structure in which switching may be performed between the modes by a simple manipulation of a user. In addition, the present invention is directed to providing a structure in which a clamp may be stably fixed in the open mode.

[0008] In addition, the present invention is directed to improving a complex conventional structure by substituting a conventional motor with a motor having a new type and newly designing a dedicated motor to be disposed in each module. Accordingly, the present invention is directed to minimizing an unbalance of internal weight and improving user convenience.

[0009] According to an aspect of the present invention, there is provided an auto strapping packaging tool having a clamp fixing apparatus, the auto strapping packaging tool including a body assembly, a tension module which is partially coupled to the body assembly and provides a tensile force to a plastic band using a first motor, a feed wheel part rotated by the first motor about a first shaft, and a clamp part disposed around the feed wheel part and rotated about a second shaft, a welding module which includes a second motor and a third motor and provides a friction force to the plastic band to which the tensile force is applied by the tension module, a hooking part provided with a first hooking element axially rotatably disposed in the body assembly and a second hooking element fixedly disposed in the body assembly, and a lever unit which is axially rotatably coupled to the body assembly and switched to an open mode while a position thereof is fixed by being hooked on the first hooking element when a pulling operation of a user is applied thereto.

[0010] In a process in which the lever unit is switched to the open mode, the clamp part may be axially rotated around the feed wheel part to be opened.

[0011] The lever unit may include a lever body having a handle formed on one end thereof, and a shaft hole formed in the other end to be axially rotatable, a first hooking piece which extends outward from the lever body and has a hooking step formed on an end portion thereof, and an extension hooking member coupled to the other end of the lever body and released from hooking on the second hooking element when the lever unit is switched

to the open mode.

[0012] The tension module may further include an annular ring portion which is coupled to the feed wheel part to be rotated about the first shaft and has a first tooth formed on a part thereof and a protruding piece formed on another part thereof in a radial direction.

[0013] A connecting piece having one end connected to an end portion of a lever shaft and the other end in which a second tooth engaged with the first tooth is formed, may be disposed between the lever unit and the tension module.

[0014] The first hooking element may include a pressing button bar pressed by the user and coupled to the first hooking element so that the first hooking element is axially rotated.

[0015] The first hooking element may have a cylindrical shape, and a plurality of hooking steps disposed to be spaced apart from each other in one direction may be formed on an outer circumferential surface of the first hooking element.

[0016] The welding module may include a friction providing unit which is disposed in the body assembly and linearly reciprocates due to second power generated by the second motor to provide the friction force to the plastic band to which the tensile force is applied by the tension module, and an opening and closing unit which has one end coupled to the friction providing unit, performs link movement due to third power generated by the third motor to provide vertical movement for the friction providing unit, and opens or closes the friction providing unit through an operation according to axial rotation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The above and other objects, features and advantages of the present invention will become more apparent to those of ordinary skill in the art by describing exemplary embodiments thereof in detail with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of an auto strapping packaging tool having a clamp fixing apparatus according to one embodiment of the present invention; FIG. 2 is a plan view of FIG. 1 when viewed from above; FIG. 3 is an exploded perspective view of FIG. 1; FIG. 4 is an exploded perspective view illustrating a lever unit of FIG. 1; FIG. 5 is an exploded perspective view illustrating a welding module of FIG. 1; FIGS. 6A to 6C are a set of views showing a process in which a clamp part is fixed by an operation of the hooking part and the lever unit of FIG. 1; and FIGS. 7A and 7B are a set of views showing rotation of the clamp part in the process of FIG. 6.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0018] Hereinafter, when the present invention is described, in a case in which it is determined that the detailed descriptions of related technologies well-known to those skilled in the art unnecessarily obscure the gist of the invention, the detailed descriptions will be omitted. The terminologies used herein are for the purpose of describing particular embodiments only and are not intended to be limiting to the invention. As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise.

[0019] It will be further understood that the terms "comprises," "comprising," "includes" and/or "including," when used herein, specify the presence of stated features, integers, steps, operations, elements, components, and/or groups thereof but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0020] Hereinafter, a specific embodiment of the present invention will be described in detail with reference to the accompanying drawings.

[0021] FIG. 1 is a perspective view of an auto strapping packaging tool having a clamp fixing apparatus according to one embodiment of the present invention, FIG. 2 is a plan view of FIG. 1 when viewed from above, and FIG. 3 is an exploded perspective view of FIG. 1. Referring to FIGS. 1 to 3, the auto strapping packaging tool including the clamp fixing apparatus according to one embodiment of the present invention may include a body assembly 100, a tension module 200, a welding module 300, a hooking part 400, a lever unit 500, and the like.

[0022] In the auto strapping packaging tool, a tensile force having a predetermined magnitude is applied to a plastic band by the tension module 200 after the packaging plastic band is disposed to wrap around goods. In addition, in the auto strapping packaging tool, the plastic band receives friction heat caused by vibration in a state in which the plastic band is pressed by the welding module 300, and portions of the plastic band, which overlaps itself in two layers, are locally melted so that the portions are bonded. In this case, the plastic band may be formed of a polypropylene (PP) material, a polyethylene terephthalate (PET) material, or the like.

[0023] The body assembly 100 according to one embodiment may include a part of a body housing. The body assembly 100 allows internal components, for example, the tension module 200, to be stably disposed in the body housing. In the body assembly 100, the hooking part 400 and the like are installed and provide uses and functions. In addition, the body assembly 100 is formed in a shape designed in advance to provide systematic relationships between the internal components and smooth implementation of the functions therethrough.

[0024] The tension module 200 is partially coupled to the body assembly 100 and provides a tensile force to

the plastic band through a first motor 210, a feed wheel part 220 which is rotated about a first shaft a1 by the first motor 210, and a clamp part 230 which is disposed around the feed wheel part 220 and rotated about a second shaft a2. The tension module 200 receives a rotational force provided by the first motor 210 to wrap and pull one end of the plastic band. The tension module 200 may provide the tensile force to the plastic band through the operation of pooling the plastic band in a strapping process.

[0025] The tension module 200 may include the first shaft a1 which is disposed at a central portion and axially rotated, a worm gear unit which is a gear assembly disposed on an outer circumference of the first shaft a1, engaged with the first shaft a1, and rotated at a reduced speed, and the like. In addition, the tension module 200 may further include the feed wheel part 220 which is coupled to an outer circumferential surface of the worm gear unit and rotated therewith and wraps and pulls the plastic band using a friction force caused by pressurization, and the like. In this case, the feed wheel part 220 has a cylindrical shape, and a knurling portion is formed on an outer circumferential surface thereof. In addition, the first motor 210 is disposed in a rear portion in the tension module 200. A first driving shaft of the first motor 210 is disposed to be parallel to the first shaft a1. A spur gear, which transmits a rotational force to the first shaft a1, is coupled to the first driving shaft. As a result, first power generated by the first motor 210 may be transmitted to the feed wheel part 220 through the first driving shaft, the first shaft a1, and the worm gear unit.

[0026] Meanwhile, the tension module 200 may further include an annular ring portion 240 which is coupled to the feed wheel part 220 and is rotated about the first shaft a1, and on which a first tooth 241 is formed on one part thereof, and a protruding piece 242 is formed on another part thereof in a radial direction. The annular ring portion 240 has a ring shape and reciprocates within a predetermined angular range by a connecting piece 610 when coupled to the feed wheel part 220.

[0027] The clamp part 230 has substantially an "L" shape and rotates about the second shaft a2. A curved knurling portion may be formed on the clamp part 230 to correspond to the knurling portion. In addition, a groove, in which the protruding piece 242 is accommodated and coupled thereto, is formed in an end of the clamp part 230. As a result, the clamp part 230 is rotated about the second shaft a2 according to rotation due to the annular ring portion 240. For example, when a pulling operation of a user is applied to the lever unit 500, the clamp part 230 is separated from the feed wheel part 220, and the plastic band may be inserted into a gap therebetween. Conversely, when the pulling operation is released so that the lever unit 500 moves in an opposite direction, the clamp part 230 becomes close to the feed wheel part 220.

[0028] FIG. 4 is an exploded perspective view illustrating the lever unit of FIG. 1, and FIG. 5 is an exploded

perspective view illustrating the welding module of FIG. 1. The welding module 300 includes a second motor 311 and a third motor 351 and provides a friction force to the plastic band to which the tensile force is applied by the tension module 200. As described above, the auto strapping packaging tool includes the first motor 210 to the third motor 351. In this case, rotating speeds, rotating times, and the like of the first motor 210 to the third motor 351 are controlled by a control part (not shown). The first motor 210 to the third motor 351 may be electric motors operated by power provided from the outside (or a power source such as an internal battery).

[0029] The welding module 300 is disposed at one side of the tension module 200 and provides friction heat to bond the plastic band disposed in two layers. Meanwhile, although units, components, and the like included in the welding module 300 are not illustrated in the drawings, all or some thereof may be installed, held, and fixed using the above-described holding elements.

[0030] Specifically, the welding module 300 may include a friction providing unit 310 which is disposed in the body assembly 100 and linearly reciprocates due to second power generated by the second motor 311 to provide the friction force to the plastic band to which the tensile force is applied by the tension module 200 and an opening and closing unit 350 having one end coupled to the friction providing unit 310, and performing link movement caused by third power generated by the third motor 351 to provide vertical movement for the friction providing unit 310 and open or close the friction providing unit 310 through an operation according to axial rotation.

[0031] In addition, since the first motor 210 to the third motor 351 are disposed in modules, each of the tension module 200 and the welding module 300 are formed in units of modules, and thus, driving of the first motor 210 to the third motor 351 may be individually controlled. In addition, the first motor 210 to the third motor 351 are disposed in rear portions in the modules, and thus the weight of the auto strapping packaging tool may be easily distributed. This is a difference from an inner layout of a conventional auto strapping packaging tool and may improve user convenience. That is, since the weight applied to the auto strapping packaging tool may be effectively distributed, even when the user performs packaging work for a long time, there is no strain on a wrist joint and the like.

[0032] A bevel gear is coupled to a second driving shaft of the second motor 311. Meanwhile, due to an arrangement direction of the second motor 311, the welding module 300 according to one embodiment may further include a spur gear part 330 disposed between the second motor 311 and the friction providing unit 310 to transmit the second power therebetween. The spur gear part 330 may include 1) a first connecting shaft on which the bevel gear and the spur gear are coupled to an outer circumferential surface and which is perpendicularly engaged with the second driving shaft by the bevel gear, and 2) a second connecting shaft which is disposed to be parallel to the

first connecting shaft and to which a spur gear engaged with a spur gear of the first connecting shaft is coupled so that the second connecting shaft is driven by a rotational force of the first connecting shaft.

[0033] The friction providing unit 310 may include the second motor 311, a second driven shaft 321, an inner gripper part 323, an outer gripper part 326, a lower gripper part 329, and the like. The second driven shaft 321 is driven by the second power, and a second eccentric element 322 is formed on an outer circumferential surface of the second driven shaft 321. Meanwhile, a spur gear engaged with the spur gear part 330 is coupled to one end of the second driven shaft 321.

[0034] A half ring piece 324 formed on one end of the inner gripper part 323 is held on the second driven shaft 321 so that the inner gripper part 323 linearly and slidably reciprocates by a cam movement according to axial rotation of the second driven shaft 321, and guide protrusions 325 are formed on both side surfaces of the inner gripper part 323. The inner gripper part 323 is moved downward by the opening and closing unit 350 and linearly reciprocates within a predetermined stroke due to the second power of the second motor 311. That is, the inner gripper part 323 vibrates. Meanwhile, a knurling plate may be formed on a lower surface of the inner gripper part 323. Grooves are repeatedly formed in a lateral or diagonal direction to have a predetermined pattern in the knurling plate.

[0035] One end of the outer gripper part 326 is axially rotatably coupled to the second driven shaft 321, and the inner gripper part 323 may be accommodated in the outer gripper part 326 and may slidably enter or exit the outer gripper part 326. To this end, the outer gripper part 326 may further include protrusion grooves 327 formed in inner side surfaces thereof to correspond to the guide protrusions 325 and a coupling hole 328 on which a part of an upper surface is open, and to which an end portion of a connecting rod part 356 is axially rotatably coupled. The lower gripper part 329 is disposed at a position facing a lower side of the inner gripper part 323. Meanwhile, a knurling plate is also formed on an upper surface of the lower gripper part 329.

[0036] Meanwhile, the second power generated by the second motor 311 is finally transmitted to the inner gripper part 323 through the second driving shaft, the spur gear part 330, and the second driven shaft 321. Meanwhile, the welding module 300 may further include a cutting unit (not shown) which is moved downward in conjunction with downward movement of the opening and closing unit 350 to cut the plastic band.

[0037] The opening and closing unit 350 is coupled to an upper portion of the friction providing unit 310, and when the third power is transmitted thereto, the opening and closing unit 350 provides vertical movement for the friction providing unit 310 to open or close the friction providing unit 310 through the operation according to axial rotation. The opening and closing unit 350 may include the third motor 351, an eccentric driving shaft 352, a link

part 354, a connecting rod part 356, an elastic member 358, an opening and closing unit holding element 359, and the like. The eccentric driving shaft 352 is disposed at the other end of the third motor 351 to be eccentric to one side.

[0038] When the eccentric driving shaft 352 disposed at an upper end of the opening and closing unit 350 rotates, the connecting rod part 356 is moved downward, and the friction providing unit 310 is pressed by the connecting rod part 356. In this case, the plastic band disposed in two layers between the inner gripper part 323 and the lower gripper part 329 is pressed.

[0039] One end of the link part 354 is coupled to an end portion of the eccentric driving shaft 352. The link part 354 performs cam movement according to axial rotation of the eccentric driving shaft 352. One end of the connecting rod part 356 is coupled to the link part 354, and the other end thereof is coupled to the friction providing unit 310 to vertically move the friction providing unit 310 according to rotation of the eccentric driving shaft 352. In addition, the elastic member 358, which buffers vibration generated by linear reciprocating movement of the friction providing unit 310, may be disposed on an outer circumferential surface of the connecting rod part 356. The third power generated by the third motor 351 is finally transmitted to the friction providing unit 310 through the eccentric driving shaft 352, the link part 354, and the connecting rod part 356.

[0040] The hooking part 400 is composed of a first hooking element 410 axially rotatably disposed on the body assembly 100 and a second hooking element 420 fixedly disposed on the body assembly 100. Specifically, the first hooking element 410 has a cylindrical shape, and a plurality of hooking steps disposed to be spaced apart from each other in one direction are formed on an outer circumferential surface of the first hooking element 410. In addition, the first hooking element 410 may include a pressing button bar 411 which is pressed by the user and coupled to the first hooking element 410 so that the first hooking element 410 is axially rotated. In addition, the first hooking element 410 may include a torsion spring that is compressed in the direction of axial rotation when the pressing button bar 411 is pressed.

[0041] The second hooking element 420 is fixedly disposed in the body assembly 100. Specifically, the second hooking element 420 has a cylindrical shape, and a plurality of hooking steps disposed to be spaced apart from each other in one direction are formed on an outer circumferential surface of the second hooking element 420. A shape of the second hooking element 420 may be the same as or similar to that of the first hooking element 410.

[0042] The lever unit 500 is axially rotatably coupled to the body assembly 100, and when the pulling operation is applied to the lever unit 500 by the user, the lever unit 500 is hooked on the first hooking element 410 so that a position thereof is fixed, and the lever unit 500 is switched to an open mode. Meanwhile, in the process in which the lever unit 500 is switched to the open mode, the clamp

part 230 axially rotates around the feed wheel part 220 to be opened. In the open mode, a hooking step of a first hooking piece 520 is hooked on the first hooking element 410 so that a lever body 510 is fixed at that position. In this case, a lever shaft 531 is also rotated by the same angle to rotate the annular ring portion 240 through the connecting piece 610. As a result, the clamp part 230 is separated from the feed wheel part 220, fixed in that state, and opened.

[0043] Specifically, the lever unit 500 may include the lever body 510, the first hooking piece 520, an extension hooking member 530, and the like. A handle is formed on one end of the lever body 510, and a shaft hole 511 is formed in the other end thereof so that the lever body 510 is axially rotatable. In addition, a coil spring is disposed in the lever body 510. The lever body 510 is rotated by a predetermined angle by the pulling operation of the user, and when the pulling operation is released in that state, the lever body 510 is returned to an original position due to an elastic restoring force of the coil spring. The first hooking piece 520 extends outward from the lever body 510, and a hooking step is formed on an end portion of the first hooking piece 520.

[0044] The extension hooking member 530 is coupled to the other end of the lever body 510, and when the lever unit 500 is switched to the open mode, the extension hooking member 530 is released from hooking on the second hooking element 420. Conversely, the lever body 510 is switched to a closed mode from the open mode, the extension hooking member 530 is hooked on and coupled to the second hooking element 420. The extension hooking member 530 is rotated by the same angle in conjunction with rotation of the lever body 510. The extension hooking member 530 may include a member body, the lever shaft 531 which is formed on one side surface of the member body and passes through and is coupled to the shaft hole 511, and a second hooking piece 532 which extends outward from the member body and in which a hooking step is formed on an end portion thereof.

[0045] Meanwhile, the connecting piece 610 having one end coupled to an end portion of the lever shaft 531 and the other end in which a second tooth engaged with the first tooth 241 is formed, may be disposed between the lever unit 500 and the tension module 200. The connecting piece 610 is rotated by a predetermined angle to correspond to rotation of the lever shaft 531. When the connecting piece 610 rotates, the annular ring portion 240 engaged with the connecting piece 610 is also rotated.

[0046] FIGS. 6A to 6C are a set of views showing a process in which the clamp part is fixed by an operation of the hooking part and the lever unit of FIG. 1, and FIGS. 7A and 7B are a set of views showing rotation of the clamp part in the process of FIG. 6. In FIG. 6A, the second hooking piece 532 of the lever unit 500 is hooked on the second hooking element 420. In this case, the clamp part 230 is close to (or partially in contact with) the feed wheel

part 220 as in FIG. 7B. This is referred to as the closed mode. First, a process in which the plastic band is inserted into the tension module 200 is performed for strapping. Referring to FIGS. 6B and 6C, first, the user presses the pressing button bar 411 to rotate the first hooking element 410 to a predetermined angle. Then, the user applies the pulling operation to the lever body 510 so that the end portion, that is, the hooking step, of the first hooking piece 520 is hooked on and coupled to the first hooking element 410.

[0047] In this case, even when the user releases the pulling operation from the lever body 510, the lever body 510 maintains the hooked state. In addition, the extension hooking member 530 is rotated in conjunction with the pulling operation for the lever body 510, and as a result, the second hooking piece 532 is released from hooking on the second hooking element 420.

[0048] In addition, the clamp part 230 rotates about the second shaft a2 in conjunction with the pulling operation for the lever body 510. As a result, as illustrated in FIG. 7A, the clamp part 230 is separated and moved away from the feed wheel part 220, and the clamp part 230 is fixed in that state. That is, the closed mode is switched to the open mode. In this case, the plastic band may be inserted into the tension module 200. Specifically, the connecting piece 610 rotates the annular ring portion 240 engaged therewith, and the annular ring portion 240 rotates the clamp part 230 using the protruding piece 242.

[0049] Meanwhile, in order to switch the open mode to the closed mode, the user presses the first hooking piece 520 in a downward direction. In this case, the first hooking element 410 is rotated by a predetermined angle, and the lever unit 500 is returned to an original position by an elastic restoring force of the coil spring. Meanwhile, in the above-described process, the connecting piece 610 rotates the annular ring portion 240 in a reverse direction. As a result, the clamp part 230 becomes close to (or is partially in contact with) the feed wheel part 220.

[0050] Since the tension module 200 and the welding module 300 according to one embodiment are formed in units of modules, driving thereof is individually controlled. That is, the tension module 200 and the welding module 300 are completely separated and independently operated. Therefore, the productivity is improved, and assembly efficiency is maximized.

[0051] A strapping process performed by the auto strapping packaging tool will be described below. First, the plastic band receives a tensile force having a magnitude preset by the first power generated by the first motor 210. Accordingly, the tensile force providing process is completed. Then, the welding module 300 is operated for welding. A welding process is started by an operation of the opening and closing unit 350. In this process, when the connecting rod part 356 is moved downward by the third power generated by the third motor 351, the friction providing unit 310 in the open state is switched to the closed state. Then, the friction providing unit 310 linearly reciprocates due to the second power generated

by the second motor 311 to provide a friction force to the plastic band provided through the tension module 200. As a result, the plastic band, which overlaps itself in two layers, disposed between the inner gripper part 323 and the lower gripper part 329 is locally melted and two layers are bonded.

[0052] According to a solution of the objectives of the present invention, various effects including the following contents can be expected. However, the present invention is not implemented only when all of the following effects are acquired.

[0053] In an auto strapping packaging tool having a clamp fixing apparatus according to one embodiment of the present invention, an open mode and a closed mode for a clamp can be switched by a simple manipulation of a user.

[0054] In the auto strapping packaging tool including the clamp fixing apparatus according to one embodiment of the present invention, there are the open mode and the closed mode. In addition, switching between the modes can be performed by the simple manipulation of the user. In addition, the clamp can be stably fixed in the open mode.

[0055] In addition, by substituting a conventional motor with new kinds of motors and newly designing a designated motor being disposed in each module, a complex conventional structure can be effectively improved. Therefore, an unbalance of internal weight can be minimized to improve user convenience.

[0056] Although an example of the exemplary embodiment of the present invention has been described, the scope of the present invention is not limited to the specific embodiment and may be properly changed within the range described in the claims.

Claims

1. An auto strapping packaging tool having a clamp fixing apparatus, comprising:

a body assembly;
a tension module which is partially coupled to the body assembly and provides a tensile force to a plastic band using a first motor, a feed wheel part rotated by the first motor about a first shaft, and a clamp part disposed around the feed wheel part and rotated about a second shaft;
a welding module which includes a second motor and a third motor and provides a friction force to the plastic band to which the tensile force is applied by the tension module;
a hooking part provided with a first hooking element axially rotatably disposed in the body assembly and a second hooking element fixedly disposed in the body assembly; and
a lever unit which is axially rotatably coupled to the body assembly and switched to an open

mode while a position thereof is fixed by being hooked on the first hooking element when a pulling operation of a user is applied thereto.

2. The auto strapping packaging tool of claim 1, wherein in a process in which the lever unit is switched to the open mode, the clamp part is axially rotated around the feed wheel part to be opened.
3. The auto strapping packaging tool of claim 1 or 2, wherein the lever unit includes:
 - a lever body having a handle formed on one end thereof, and a shaft hole formed in the other end to be axially rotatable;
 - a first hooking piece which extends outward from the lever body and has a hooking step formed on an end portion thereof; and
 - an extension hooking member which is coupled to the other end of the lever body and released from hooking on the second hooking element when the lever unit is switched to the open mode.
4. The auto strapping packaging tool of any one of claims 1 to 3, wherein the tension module further includes an annular ring portion which is coupled to the feed wheel part to be rotated about the first shaft and has a first tooth formed on a part thereof and a protruding piece formed on another part thereof in a radial direction.
5. The auto strapping packaging tool of claim 4, wherein a connecting piece having one end connected to an end portion of a lever shaft and the other end in which a second tooth engaged with the first tooth is formed is disposed between the lever unit and the tension module.
6. The auto strapping packaging tool of any one of claims 1 to 5, wherein the first hooking element includes a pressing button bar pressed by the user and coupled to the first hooking element so that the first hooking element is axially rotated.
7. The auto strapping packaging tool of any one of claims 1 to 6, wherein:
 - the first hooking element has a cylindrical shape; and
 - a plurality of hooking steps disposed to be spaced apart from each other in one direction are formed on an outer circumferential surface of the first hooking element.
8. The auto strapping packaging tool of any one of claims 1 to 7, wherein the welding module includes:
 - a friction providing unit which is disposed in the

body assembly and linearly reciprocates due to second power generated by the second motor to provide the friction force to the plastic band to which the tensile force is applied by the tension module; and

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an opening and closing unit which has one end coupled to the friction providing unit, performs link movement due to third power generated by the third motor to provide vertical movement for the friction providing unit, and opens or closes the friction providing unit through an operation according to axial rotation.

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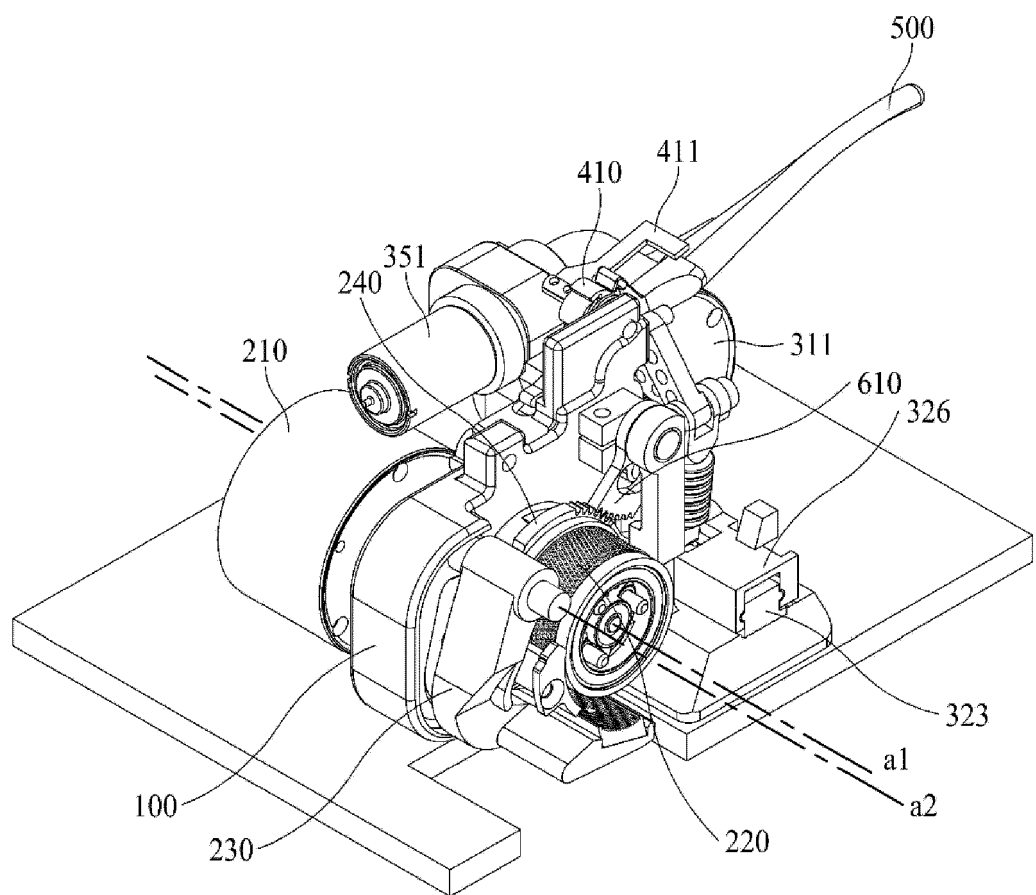
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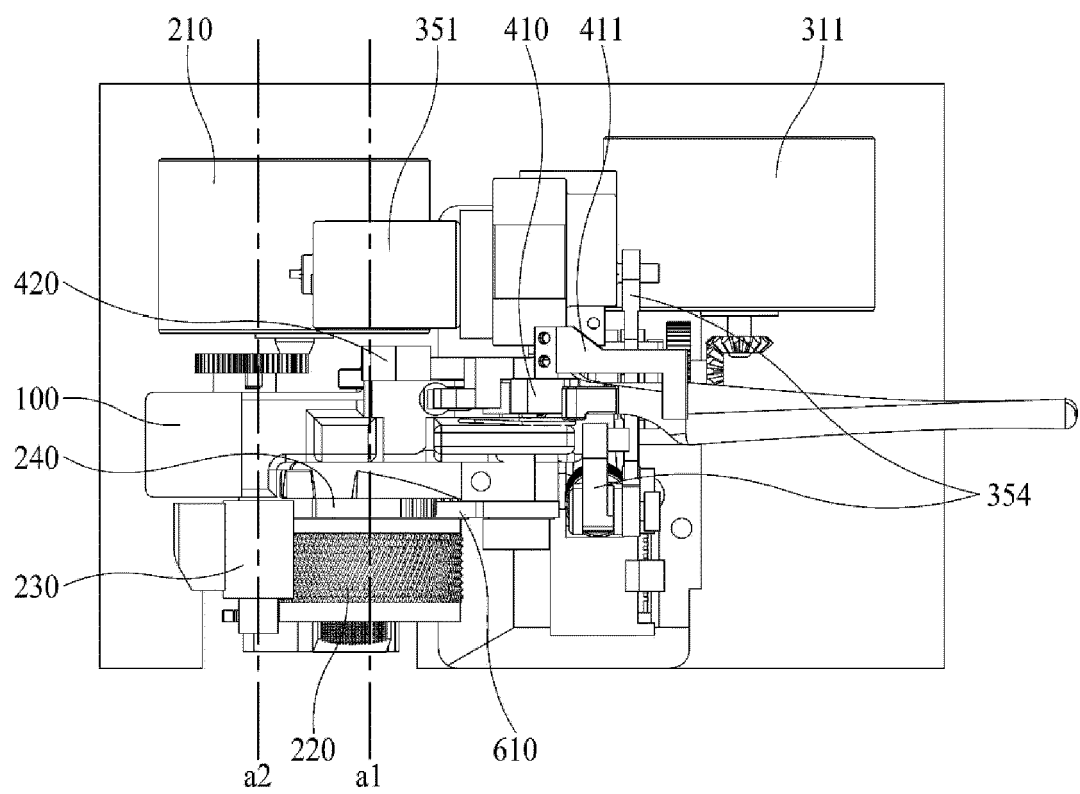
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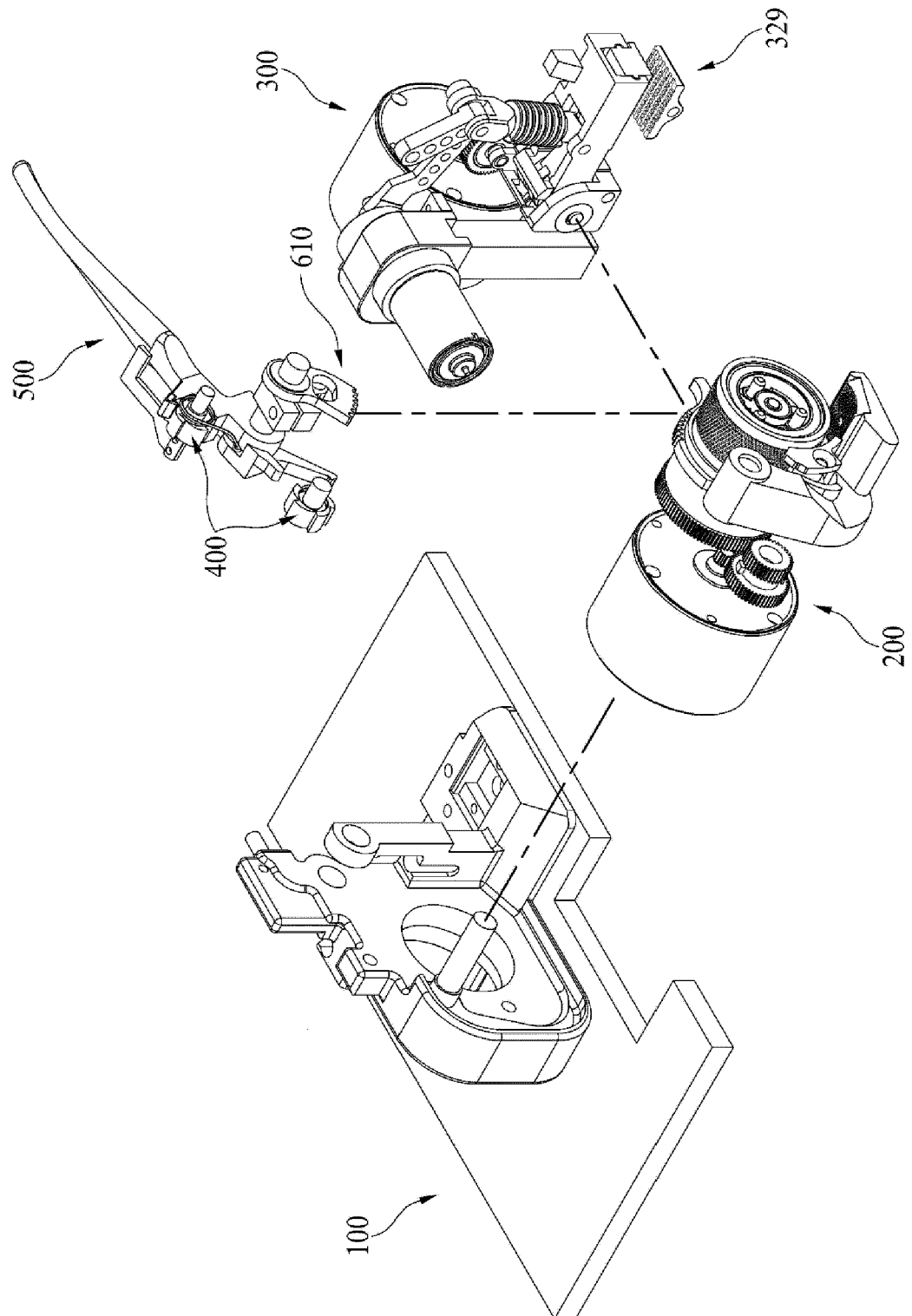
【Fig. 1】



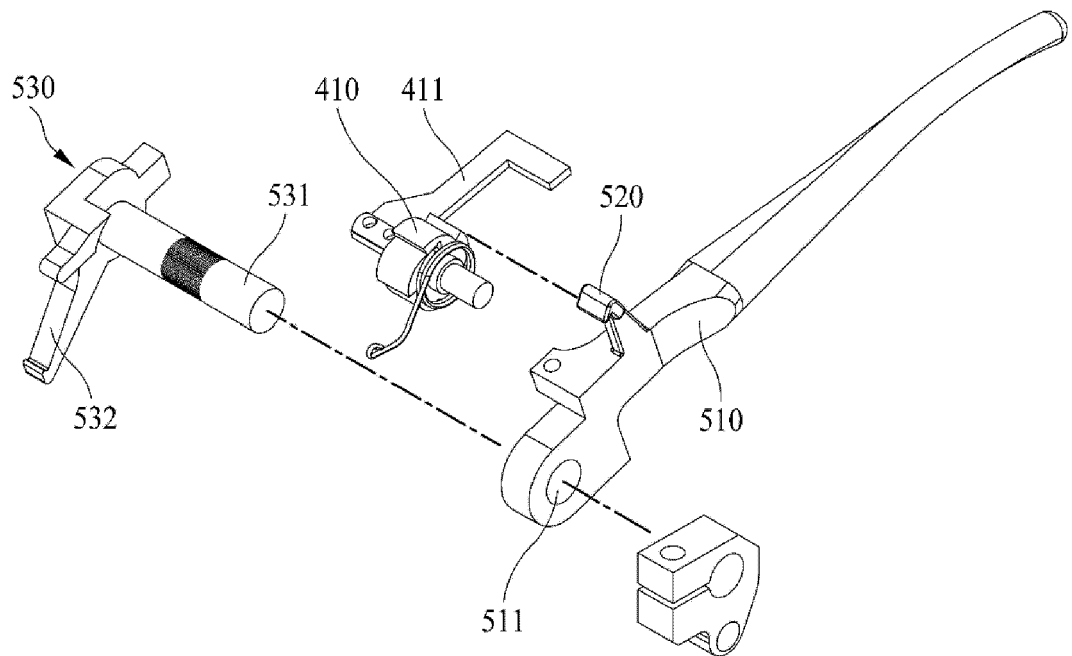
【Fig. 2】



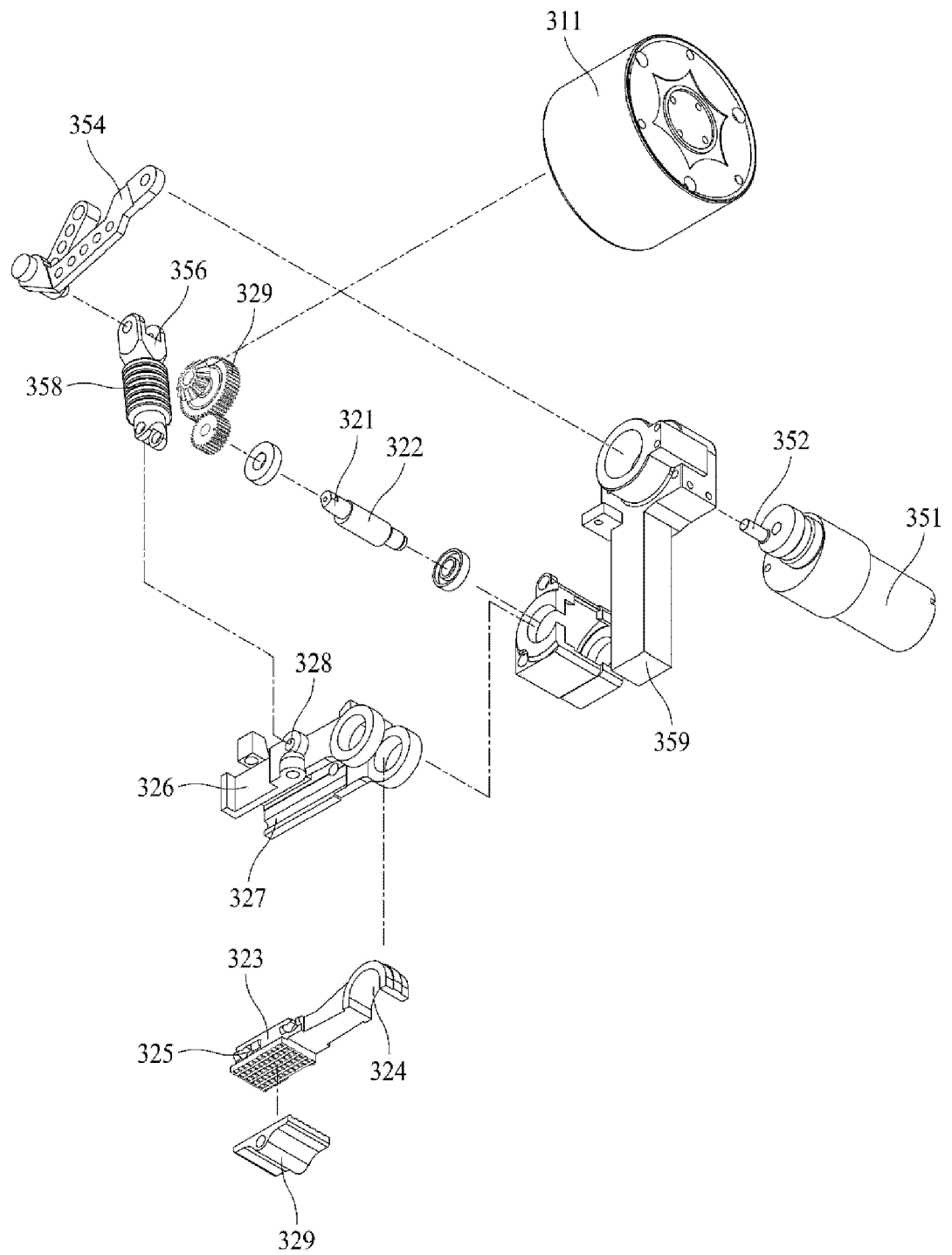
【Fig. 3】



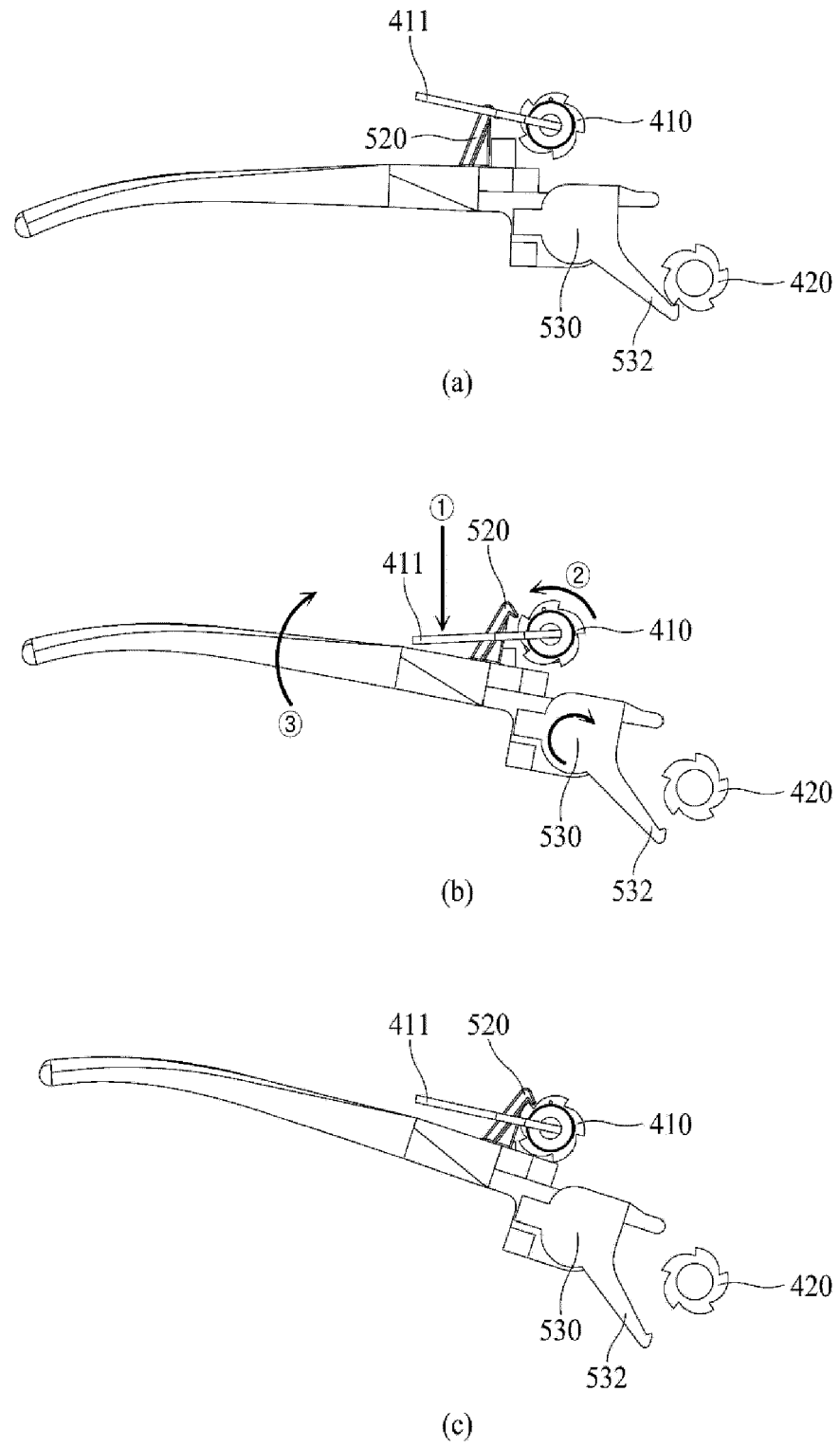
【Fig. 4】



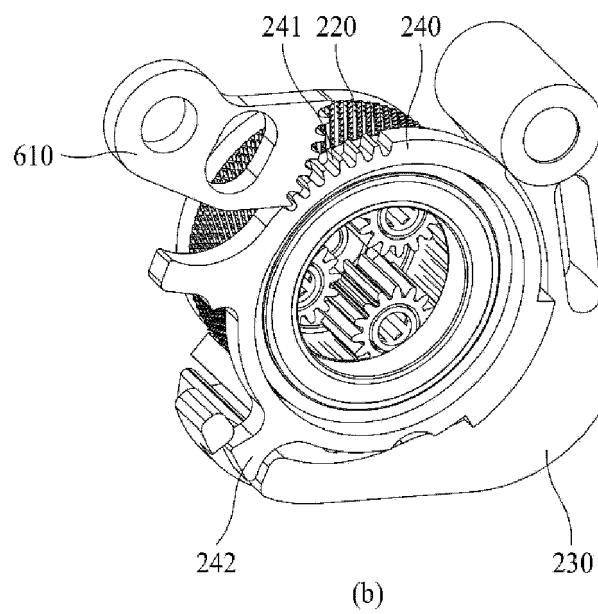
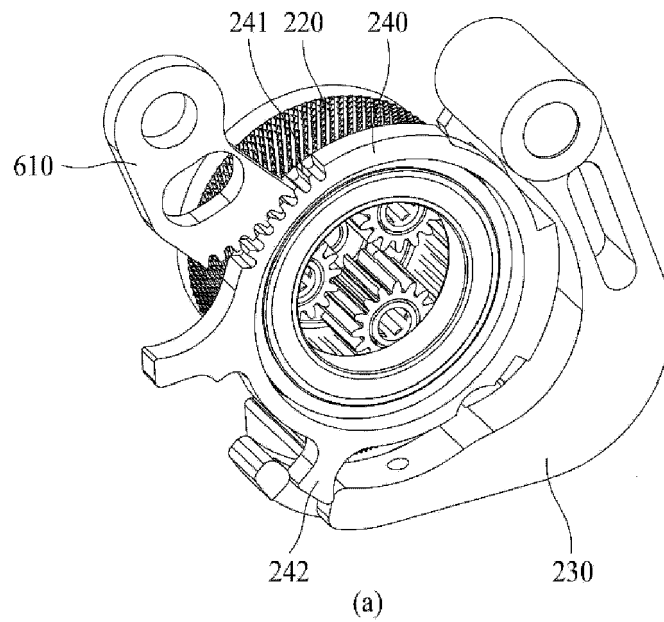
【Fig. 5】



【Fig. 6】



【Fig. 7】





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Place of search Munich		Date of completion of the search 17 February 2022	Examiner Lawder, M
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