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(54) **ANTI-SLIP FASTENER DRIVER**

(57) An anti-slip fastener driver (10) includes a shank (20) and a driving portion (30) formed on an end of the shank (20) and defining a longitudinal axis (L). The driving portion (30) includes an outer periphery surrounding the longitudinal axis (L) and having a first peripheral face (31). An end of the driving portion (30) opposite to the shank (20) includes a first end face (32) connected to the first peripheral face (31). The first end face (32) includes a first side (321) and a first angle (322) located outside of the first side (321). The end of the driving portion (30) opposite to the shank (20) includes a reference plane (P) perpendicular to the longitudinal axis (L). The first side (321) is located on the reference plane (P). An end of the first side (321) is adjacent to the longitudinal axis (L). Another end of the first side (321) opposite to the longitudinal axis (L) is connected to the first peripheral face (31). The first angle (322) is located between the reference plane (P) and the shank (20).

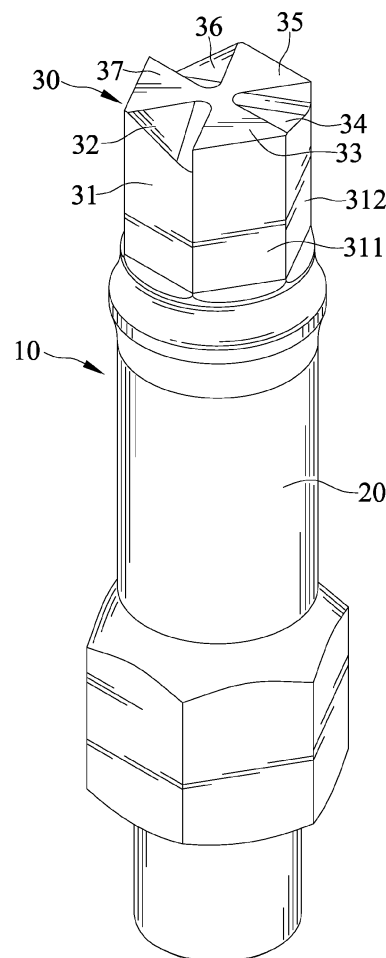


FIG. 1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a fastener driver and, more particularly, to an anti-slip fastener driver.

[0002] A conventional fastener driver, such as a hexagonal wrench, a screwdriver, etc. is a hand tool that is usually used to driver a fastener, such as a bolt or a screw. Considering the costs and the fact that the fasteners are common expendables, the fasteners are generally made of materials softer than the fastener drivers, resulting in wear of the fasteners while being driven by the fastener drivers. Furthermore, a fastener forcibly driven by a fastener driver of a size not matching with the fastener will wear, too. The wear of a fastener result in damage to a driving hole of the fastener. In a case that the driving hole of the fastener becomes a nearly circular hole, when the fastener driver engages with the driving hole and rotates to drive the fastener, the fastener driver slips relative to the fastener, failing to effectively drive the fastener.

BRIEF SUMMARY OF THE INVENTION

[0003] In a first aspect of the present invention, an anti-slip fastener driver comprises a shank and a driving portion formed on an end of the shank and defining a longitudinal axis. The driving portion includes an outer periphery surrounding the longitudinal axis and having a first peripheral face. An end of the driving portion opposite to the shank includes a first end face connected to the first peripheral face. The first end face includes a first side and a first angle located outside of the first side. The end of the driving portion opposite to the shank includes a reference plane perpendicular to the longitudinal axis. The first side is located on the reference plane. An end of the first side is adjacent to the longitudinal axis. Another end of the first side opposite to the longitudinal axis is connected to the first peripheral face. The first angle is located between the reference plane and the shank.

[0004] In a second aspect of the present invention, an anti-slip fastener driver comprises a shank and a driving portion formed on an end of the shank and defining a longitudinal axis. The driving portion includes an outer periphery surrounding the longitudinal axis and having a first peripheral face. An end of the driving portion opposite to the shank includes a front conical face and a first end face. The front conical face is a conical face centered at the longitudinal axis. The first end face is connected to the first peripheral face. The first end face includes a first side and a first angle not located on the first side. The first side is located on the front conical face. An end of the first side is adjacent to the longitudinal axis. Another end of the first side opposite to the longitudinal axis is connected to the first peripheral face. The first angle is located between the front conical face and the shank along the longitudinal axis.

[0005] The present invention will become clearer in

light of the following detailed description of illustrative embodiments of this invention described in connection with the drawings.

DESCRIPTION OF THE DRAWINGS

[0006]

FIG. 1 is a perspective view of an anti-slip fastener driver of a first embodiment according to the present invention.

FIG. 2 is a partial, side elevational view of the anti-slip fastener driver of the first embodiment according to the present invention.

FIG. 3 is an end elevational view of the anti-slip fastener driver of the first embodiment according to the present invention.

FIG. 4 is a perspective view of an anti-slip fastener driver of a second embodiment according to the present invention.

FIG. 5 is a partial, side elevational view of the anti-slip fastener driver of the second embodiment according to the present invention.

FIG. 6 is an end elevational view of the anti-slip fastener driver of the second embodiment according to the present invention.

FIG. 7 is a perspective view of an anti-slip fastener driver of a third embodiment according to the present invention.

FIG. 8 is a partial, side elevational view of the anti-slip fastener driver of the third embodiment according to the present invention.

FIG. 9 is an end elevational view of the anti-slip fastener driver of the third embodiment according to the present invention.

FIG. 10 is a perspective view of an anti-slip fastener driver of a fourth embodiment according to the present invention.

FIG. 11 is a partial, side elevational view of the anti-slip fastener driver of the fourth embodiment according to the present invention.

FIG. 12 is an end elevational view of the anti-slip fastener driver of the fourth embodiment according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0007] FIGS. 1-3 show a perspective view, a side elevational view, and an end elevational view of an anti-slip fastener driver 10 of a first embodiment according to the present invention. The anti-slip fastener driver 10 includes a shank 20 and a driving portion 30.

[0008] The driving portion 30 is formed on an end of the shank 20 and defines a longitudinal axis L. The driving portion 30 includes regular hexagonal cross sections perpendicular to the longitudinal axis L.

[0009] The driving portion 30 includes an outer periphery surrounding the longitudinal axis L and having a first

peripheral face 31, a second peripheral face 311, a third peripheral face 312, a fourth peripheral face 313, a fifth peripheral face 314, and a sixth peripheral face 315. Each of the first, second, third, fourth, fifth, and sixth peripheral faces 31, 311-315 extends in a direction parallel to the longitudinal axis L. Each two adjacent ones of the first, second, third, fourth, fifth, and sixth peripheral faces 31, 311-315 have an inner angle of 120° therebetween.

[0010] An end of the driving portion 30 opposite to the shank 20 includes a first end face 32 connected to the first peripheral face 31. The first end face 32 includes a first side 321 and a first angle 322 located outside of the first side 321. The end of the driving portion 30 opposite to the shank 20 includes a reference plane P perpendicular to the longitudinal axis L. The first side 321 is located on the reference plane P. An end of the first side 321 is adjacent to the longitudinal axis L. Another end of the first side 321 opposite to the longitudinal axis L is connected to the first peripheral face 31. The first angle 322 is located between the reference plane P and the shank 20.

[0011] The first end face 32 is connected to a first driving face 323 extending in a direction parallel to the longitudinal axis L. The first driving face 323 is connected to the first angle 322. The first driving face 323 includes an angle located on the longitudinal axis L. A side of the first driving face 323 distant to the first end face 32 is located on the reference plane P.

[0012] The end of the driving portion 30 opposite to the shank 20 includes a second end face 33 connected to the second peripheral face 311. The second peripheral face 311 is contiguous to the first peripheral face 31. The second end face 33 includes a second side 331 and a second angle 332 located outside of the second side 331. The second side 331 is located on the reference plane P and is connected to the first driving face 323. The end of the first side 321 adjacent to the longitudinal axis L has an end point located on the longitudinal axis L in this embodiment. An end of the second side 331 is connected to the first side 321. An interconnection between the first side 321 and the second side 331 is located on the longitudinal axis L. Another end of the second side 331 opposite to the longitudinal axis L is connected to the second peripheral face 311. The second angle 332 is located between the reference plane P and the shank 20.

[0013] The end of the driving portion 30 opposite to the shank 20 includes a third end face 34, a fourth end face 35, a fifth end face 36, and a sixth end face 37. The third end face 34 is connected to the third peripheral face 312. The third peripheral face 312 is contiguous to the second peripheral face 311 and is located on a side of the second peripheral face 311 opposite to the first peripheral face 31. The third end face 34 includes a third side 341 and a third angle 342 located outside of the third side 341. The third side 341 is located on the reference plane P. An end of the third side 341 is connected to the first side 321. An interconnection between the first side 321 and the third side 341 is located on the longitudinal axis L.

Another end of the third side 341 opposite to the longitudinal axis L is connected to the third peripheral face 312. The third angle 342 is located between the reference plane P and the shank 20.

[0014] The fourth end face 35 is connected to the fourth peripheral face 313. The fourth peripheral face 313 is contiguous to the third peripheral face 312 and is located on a side of the third peripheral face 312 opposite to the second peripheral face 311. The fourth peripheral face 313 is parallel to the first peripheral face 31. The fourth end face 35 includes a fourth side 351 and a fourth angle 352 located outside of the fourth side 351. The fourth side 351 is located on the reference plane P. An end of the fourth side 351 is connected to the first side 321. The first side 321 and the fourth side 351 are located on the same line. An interconnection between the first side 321 and the fourth side 351 is located on the longitudinal axis L. Another end of the fourth side 351 opposite to the longitudinal axis L is connected to the fourth peripheral face 313. The fourth angle 352 is located between the reference plane P and the shank 20.

[0015] The fifth end face 36 is connected to the fifth peripheral face 314. The fifth peripheral face 314 is contiguous to the fourth peripheral face 313 and is located on a side of the fourth peripheral face 313 opposite to the third peripheral face 312. The fifth peripheral face 314 is parallel to the second peripheral face 311. The fifth end face 36 includes a fifth side 361 and a fifth angle 362 located outside of the fifth side 361. The fifth side 361 is located on the reference plane P. An end of the fifth side 361 is connected to the second side 331. An intersection between the second side 331 and the fifth side 361 is located on the longitudinal axis L. Another end of the fifth side 361 opposite to the longitudinal axis L is connected to the fifth peripheral face 314. The fifth angle 362 is located between the reference plane P and the shank 20.

[0016] The sixth end face 37 is connected to the sixth peripheral face 315. The sixth peripheral face 315 is located between the first peripheral face 31 and the fifth peripheral face 314. The sixth peripheral face 315 is parallel to the third peripheral face 312. The sixth end face 37 includes a sixth side 371 and a sixth angle 372 located outside of the sixth side 371. The sixth side 371 is located on the reference plane P. An end of the sixth side 371 is connected to the third side 341. The third side 341 and the sixth side 371 are on the same line. An interconnection between the third side 341 and the sixth side 371 is located on the longitudinal axis L. Another end of the sixth side 371 opposite to the longitudinal axis L is connected to the sixth peripheral face 315. The sixth angle 372 is located between the reference plane P and the shank 20.

[0017] The third end face 34 is connected to a second driving face 343 extending in a direction parallel to the longitudinal axis L. The second driving face 343 is connected to the third angle 342. The second driving face 343 has an angle located on the longitudinal axis L. A

side of the second driving face 343 distant to the third end face 34 is located on the reference plane P. The fourth side 351 is connected to the second driving face 343. The fifth end face 36 is connected to a third driving face 363 extending in a direction parallel to the longitudinal axis L. The third driving face 363 is connected to the fifth angle 362. The third driving face 363 has an angle located on the longitudinal axis L. A side of the third driving face 363 distant to the fifth end face 36 is located on the reference plane P. The sixth side 371 is connected to the third driving face 363.

[0018] The second end face 33 is connected to a fourth driving face 333 extending in a direction parallel to the longitudinal axis L. The fourth driving face 333 is connected to the second angle 332. The fourth driving face 333 has an angle located on the longitudinal axis L. A side of the fourth driving face 333 distant to the second end face 33 is located on the reference plane P. The third side 341 is connected to the fourth driving face 333. The fourth end face 35 is connected to a fifth driving face 353 extending in a direction parallel to the longitudinal axis L. The fifth driving face 353 is connected to the fourth angle 352. The fifth driving face 353 has an angle located on the longitudinal axis L. A side of the fifth driving face 353 distant to the fourth end face 35 is located on the reference plane P. The fifth side 361 is connected to the fifth driving face 353. The sixth end face 37 is connected to a sixth driving face 373 extending in a direction parallel to the longitudinal axis L. The sixth driving face 373 is connected to the sixth angle 372. The sixth driving face 373 has an angle located on the longitudinal axis L. A side of the sixth driving face 373 distant to the sixth end face 37 is located on the reference plane P. The first side 321 is connected to the sixth driving face 373.

[0019] In this embodiment, the second end face 33 is a planar face extending perpendicularly to the longitudinal axis L, the second side 331 and the second angle 332 are located on the reference plane P, the third side 341 is connected to the second end face 33, the fourth end face 35 is a planar face extending perpendicularly to the longitudinal axis L, the fourth side 351 and the fourth angle 352 are located on the reference plane P, the fifth side 361 is connected to the fourth end face 35, the sixth end face 37 is a planar face extending perpendicularly to the longitudinal axis L, the sixth side 371 and the sixth angle 372 are located on the reference plane P, and the first side 321 is connected to the sixth end face 37.

[0020] In the embodiment, each of the first end face 32, the third end face 34, and the fifth end face 36 is a slant face at a non-parallel angle to the reference plane P.

[0021] The anti-slip fastener driver 10 can achieve an excellent anti-slip effect by the above structure and, thus, can smoothly drive a screw even if the driving hole of the screw is damaged. In use of the anti-slip fastener driver 10, the driving portion 30 can be inserted into the damaged driving hole in a slant direction, and the recess of the first end face 32 forms a corner at the first driving

face 323 to contact with an inner wall face of the driving hole, assisting in driving of the screw.

[0022] FIGS. 4-6 show a perspective view, a side elevational view, and an end elevational view of an anti-slip fastener driver of a second embodiment according to the present invention. The second embodiment is substantially the same as the first embodiment but is mainly different from the first embodiment by that an end of the first side 321c adjacent to the longitudinal axis L has an end point not located on the longitudinal axis L, an end of the second side 331c is adjacent to the longitudinal axis L and has an end point not located on the longitudinal axis L, an end of the third side 341c is adjacent to the longitudinal axis L and has an end point not located on the longitudinal axis L, an end of the fourth side 351c is adjacent to the longitudinal axis L and has an end point not located on the longitudinal axis L, an end of the fifth side 361c is adjacent to the longitudinal axis L and has an end point not located on the longitudinal axis L, and an end of the sixth side 371c is adjacent to the longitudinal axis L and has an end point not located on the longitudinal axis L.

[0023] The first driving face 323c does not intersect with the longitudinal axis L. The second driving face 343c does not intersect with the longitudinal axis L. The third driving face 363c does not intersect with the longitudinal axis L. The fourth driving face 333c does not intersect with the longitudinal axis L. The fifth driving face 353c does not intersect with the longitudinal axis L. The sixth driving face 373c does not intersect with the longitudinal axis L.

[0024] The second end face 33c is located on a side of the first driving face 323c opposite to the first end face 32c and is not connected to the first driving face 323c. The second side 331c is located on a side of the second end face 33c adjacent to the first driving face 323c. The fourth end face 35c is located on a side of the second driving face 343c opposite to the third end face 34c and does not intersect with the second driving face 343c. The fourth side 351c is located on a side of the fourth end face 35c adjacent to the second driving face 343c. The sixth end face 37c is located on a side of the third driving face 363c opposite to the fifth end face 36c and does not intersect with the third driving face 363c. The sixth side 371c is located on a side of the sixth end face 37c adjacent to the third driving face 363c. The third end face 34c is located on a side of the fourth driving face 333c opposite to the first end face 32c and does not intersect with the fourth driving face 333c. The third side 341c is located on a side of the third end face 34c adjacent to the fourth driving face 333c. The fifth end face 36c is located on a side of the fifth driving face 353c opposite to the fourth end face 35c and does not intersect with the fifth driving face 353c. The fifth side 361c is located on a side of the fifth end face 36c adjacent to the fifth driving face 353c. The first end face 32c is located on a side of the sixth driving face 373c opposite to the sixth end face 37c and does not intersect with the sixth driving face 373c. The

first side 321 is located on a side of the first end face 32c adjacent to the sixth driving face 373c.

[0025] The end of the driving portion 30c opposite to the shank 20c includes a seventh end face 38c. The seventh end face 38c is a planar face extending perpendicularly to the longitudinal axis L and is located on the reference plane P. The seventh end face 38c is connected to the first end face 32c, the first driving face 323c, the second end face 33c, the second driving face 343c, the third end face 34c, the third driving face 363c, the fourth end face 35c, the fourth driving face 333c, the fifth end face 36c, the fifth driving face 353c, the sixth end face 37c, and the sixth driving face 373c. An outer periphery of the seventh end face 38c surrounding the longitudinal axis L is connected to the first peripheral face 31c, the second peripheral face 311c, the third peripheral face 312c, the fourth peripheral face 313c, the fifth peripheral face 314c, and the sixth peripheral face 315c.

[0026] FIGS. 7-9 show a perspective view, a side elevational view, and an end elevational view of an anti-slip fastener driver of a third embodiment according to the present invention. The third embodiment is substantially the same as the second embodiment but is mainly different from the fourth embodiment by that the first peripheral face 31e has a lateral width W in a radial direction perpendicular to the longitudinal axis L, an end of the first side 321e adjacent to the longitudinal axis L and another end of the first side 321e connected to the first peripheral face 31e have a first length L1 therebetween, an end of the second side 331e adjacent to the longitudinal axis L and another end of the second side 331e connected to the second peripheral face 311e have a second length L2 therebetween, an end of the third side 341e adjacent to the longitudinal axis L and another end of the third side 341e connected to the third peripheral face 312e have a third length L3 therebetween, an end of the fourth side 351e adjacent to the longitudinal axis L and another end of the fourth side 351e connected to the fourth peripheral face 313e have a fourth length L4 therebetween, an end of the fifth side 361e adjacent to the longitudinal axis L and another end of the fifth side 361e connected to the fifth peripheral face 314e have a fifth length L5 therebetween, an end of the sixth side 371e adjacent to the longitudinal axis L and another end of the sixth side 371e connected to the sixth peripheral face 315e have a sixth length L6 therebetween, and each of the first length L1, the second length L2, the third length L3, the fourth length L4, the fifth length L5, and the sixth length L6 is smaller than 0.5 times the lateral width W.

[0027] Furthermore, the first driving face 323e connected to the seventh end face 38e intersects with the first side 321e. The side of the first driving face 323e and the first side 321e have a first angle A1 therebetween. A side of the fourth driving face 333e connected to the seventh end face 38e intersects with the second side 331e. The side of the fourth driving face 333e and the second side 331e have a second angle A2 therebetween. A side of the second driving face 343e connected to the seventh

end face 38e intersects with the third side 341c. The side of the second driving face 343e and the third side 341e have a third angle A3 therebetween. A side of the fifth driving face 353e connected to the seventh end face 38e intersects with the fourth side 351e. The side of the fifth driving face 353e and the fourth side 351e have a fourth angle A4 therebetween. A side of the third driving face 363e connected to the seventh end face 38e intersects with the fifth side 361e. The side of the third driving face 363e and the fifth side 361e have a fifth angle A5 therebetween. A side of the sixth driving face 373e connected to the seventh end face 38e intersects with the sixth side 371e. The side of the sixth driving face 373e and the sixth side 371e have a sixth angle A6 therebetween. Each of the first angle A1, the second angle A2, the third angle A3, the fourth angle A4, the fifth angle A5, and the sixth angle A6 is larger than 80°.

[0028] FIGS. 10-12 show a perspective view, a side elevational view, and an end elevational view of an anti-slip fastener driver 70g of a fourth embodiment according to the present invention. The anti-slip fastener driver 70g includes a shank 80g and a driving portion 90g.

[0029] The driving portion 90g is formed on an end of the shank 80g and defines a longitudinal axis L. The driving portion 90g includes regular hexagonal cross sections perpendicular to the longitudinal axis L.

[0030] The driving portion 90g includes an outer periphery surrounding the longitudinal axis L and having a first peripheral face 91g, a second peripheral face 911g, a third peripheral face 912g, a fourth peripheral face 913g, a fifth peripheral face 914g, and a sixth peripheral face 915g. Each of the first, second, third, fourth, fifth, and sixth peripheral faces 91g, 911g-915g extends in a direction parallel to the longitudinal axis L. Each two adjacent ones of the first, second, third, fourth, fifth, and sixth peripheral faces 91g, 911g-915g have an inner angle of 120° therebetween.

[0031] An end of the driving portion 90g opposite to the shank 80g includes a front conical face 92g and a first end face 93g. The front conical face 92g is a conical face centered at the longitudinal axis L. The first end face 93g is connected to the first peripheral face 91g. The first end face 93g includes a first side 931g and a first angle 932g not located on the first side 931g. The first side 931g is located on the front conical face 92g. An end of the first side 931g is adjacent to the longitudinal axis L. Another end of the first side 931g opposite to the longitudinal axis L is connected to the first peripheral face 91g. The first angle 932g is located between the front conical face 92g and the shank 80g along the longitudinal axis L.

[0032] An end of the first side 931g adjacent to the longitudinal axis L has an end point not located on the longitudinal axis L. The first end face 93g is connected to a first driving face 933g extending in a direction parallel to the longitudinal axis L. The first driving face 933g is connected to the first angle 932g. The first driving face 933g does not intersect with the longitudinal axis L. A side of the first driving face 933g distant to the first end

face 93g is located on the front conical face 92g.

[0033] The end of the driving portion 90g opposite to the shank 80g includes a second end face 94g connected to the second peripheral face 911g. The second peripheral face 911g is contiguous to the first peripheral face 91g. The second end face 94g includes a second side 941g and a second angle 942g located outside of the second side 941g. The second side 941g is located on the front conical face 92g. An end of the second side 941g is adjacent to the longitudinal axis L and has an end point not located on the longitudinal axis L. Another end of the second side 941g opposite to the longitudinal axis L is connected to the second peripheral face 911g. The second angle 942g is located between the front conical face 92g and the shank 80g along the longitudinal axis L.

[0034] The end of the driving portion 90g opposite to the shank 80g includes a third end face 95g, a fourth end face 96g, a fifth end face 97g, and a sixth end face 98g. The third end face 95g is connected to the third peripheral face 912g. The third peripheral face 912g is contiguous to the second peripheral face 911g and is located on a side of the second peripheral face 911g opposite to the first peripheral face 91g. The third end face 95g includes a third side 951g and a third angle 952g located outside of the third side 951g. The third side 951g is located on the front conical face 92g. An end of the third side 951g is adjacent to the longitudinal axis L and has an end point not located on the longitudinal axis L. Another end of the third side 951g opposite to the longitudinal axis L is connected to the third peripheral face 912g. The third angle 952g is located between the front conical face 92g and the shank 80g along the longitudinal axis L.

[0035] The fourth end face 96g is connected to the fourth peripheral face 913g. The fourth peripheral face 913g is contiguous to the third peripheral face 912g and is located on a side of the third peripheral face 912g opposite to the second peripheral face 911g. The fourth peripheral face 913g is parallel to the first peripheral face 91g. The fourth end face 96g includes a fourth side 961g and a fourth angle 962g located outside of the fourth side 961g. The fourth side 961g is located on the front conical face 92g. An end of the fourth side 961g is adjacent to the longitudinal axis L and has an end point not located on the longitudinal axis L. Another end of the fourth side 961g opposite to the longitudinal axis L is connected to the fourth peripheral face 913g. The fourth angle 962g is located between the front conical face 92g and the shank 80g along the longitudinal axis L.

[0036] The fifth end face 97g is connected to the fifth peripheral face 914g. The fifth peripheral face 914g is contiguous to the fourth peripheral face 913g and is located on a side of the fourth peripheral face 913g opposite to the third peripheral face 912g. The fifth peripheral face 914g is parallel to the second peripheral face 911g. The fifth end face 97g includes a fifth side 971g and a fifth angle 972g located outside of the fifth side 971g. The fifth side 971g is located on the front conical face 92g.

An end of the fifth side 971g is adjacent to the longitudinal axis L and has an end point not located on the longitudinal axis L. Another end of the fifth side 971g opposite to the longitudinal axis L is connected to the fifth peripheral face 914g. The fifth angle 972g is located between the front conical face 92g and the shank 80g along the longitudinal axis L.

[0037] The sixth end face 98g is connected to the sixth peripheral face 915g. The sixth peripheral face 915g is located between the first peripheral face 91g and the fifth peripheral face 914g. The sixth peripheral face 915g is parallel to the third peripheral face 912g. The sixth end face 98g includes a sixth side 981g and a sixth angle 982g located outside of the sixth side 981g. The sixth side 981g is located on the front conical face 92g. An end of the sixth side 981g is adjacent to the longitudinal axis L and has an end point not located on the longitudinal axis L. Another end of the sixth side 981g opposite to the longitudinal axis L is connected to the sixth peripheral face 915g. The sixth angle 982g is located between the front conical face 92g and the shank 80g along the longitudinal axis L.

[0038] The third end face 95g is connected to a second driving face 953g extending in a direction parallel to the longitudinal axis L. The second driving face 953g is connected to the third angle 952g. The second driving face 953g does not intersect with the longitudinal axis L. A side of the second driving face 953g distant to the third end face 95g is located on the front conical face 92g. The fifth end face 97g is connected to a third driving face 973g extending in a direction parallel to the longitudinal axis L. The third driving face 973g is connected to the fifth angle 972g. The third driving face 973g does not intersect with the longitudinal axis L. A side of the third driving face 973g distant to the fifth end face 97g is located on the front conical face 92g.

[0039] The second end face 94g is connected to a fourth driving face 943g extending in a direction parallel to the longitudinal axis L. The fourth driving face 943g is connected to the second angle 942g. The fourth driving face 943g does not intersect with the longitudinal axis L. A side of the fourth driving face 943g distant to the second end face 94g is located on the front conical face 92g. The fourth end face 96g is connected to a fifth driving face 963g extending in a direction parallel to the longitudinal axis L. The fifth driving face 963g is connected to the fourth angle 962g. The fifth driving face 963g does not intersect with the longitudinal axis L. A side of the fifth driving face 963g distant to the fourth end face 96g is located on the front conical face 92g. The sixth end face 98g is connected to a sixth driving face 983g extending in a direction parallel to the longitudinal axis L. The sixth driving face 983g is connected to the sixth angle 982g. The sixth driving face 983g does not intersect with the longitudinal axis L. A side of the sixth driving face 983g distant to the sixth end face 98g is located on the front conical face 92g.

[0040] The second end face 94g is located on a side

of the first driving face 933g opposite to the first end face 93g and does not intersect with the first driving face 933g. The second side 941g is located on a side of the second end face 94g adjacent to the first driving face 933g. The fourth end face 96g is located on a side of the second driving face 953g opposite to the third end face 95g and does not intersect with the second driving face 953g. The fourth side 961g is located on a side of the fourth end face 96g adjacent to the second driving face 953g. The sixth end face 98g is located on a side of the third driving face 973g opposite to the fifth end face 97g and does not intersect with the third driving face 973g. The sixth side 981g is located on a side of the sixth end face 98g adjacent to the third driving face 973g.

[0041] The third end face 95g is located on a side of the fourth driving face 943g opposite to the first end face 93g and does not intersect with the fourth driving face 943g. The third side 951g is located on a side of the third end face 95g adjacent to the fourth driving face 943g. The fifth end face 97g is located on a side of the fifth driving face 963g opposite to the fourth end face 96g and does not intersect with the fifth driving face 963g. The fifth side 971g is located on a side of the fifth end face 97g adjacent to the fifth driving face 963g. The first end face 93g is located on a side of the sixth driving face 983g opposite to the sixth end face 98g and does not intersect with the sixth driving face 983g. The first side 931g is located on a side of the first end face 93g adjacent to the sixth driving face 983g.

[0042] Each of the first, second, third, fourth, fifth, and sixth end faces 93g-98g is a slant face not perpendicular to the longitudinal axis.

[0043] The end of the driving portion 90g opposite to the shank 80g has a front face 99g. The front face 99g is a circular face orthogonal to the longitudinal axis L and centered at the longitudinal axis L. The front conical face 92g surrounds the front face 99g.

[0044] In view of the above description, the present invention includes the following advantages:

1. An anti-slip fastener driver 10 comprises a shank 20 and a driving portion 30. The driving portion 30 is formed on an end of the shank 20 and defines a longitudinal axis L. The driving portion 30 includes an outer periphery surrounding the longitudinal axis L and having a first peripheral face 31. An end of the driving portion 30 opposite to the shank 20 includes a first end face 32 connected to the first peripheral face 31. The first end face 32 includes a first side 321 and a first angle 322 located outside of the first side 321. The end of the driving portion 30 opposite to the shank 20 includes a reference plane P perpendicular to the longitudinal axis L. The first side 321 is located on the reference plane P. An end of the first side 321 is adjacent to the longitudinal axis L. Another end of the first side 321 opposite to the longitudinal axis L is connected to the first peripheral face 31. The first angle 322 is located between the

reference plane P and the shank 20. The anti-slip fastener driver 10 provides an excellent anti-slip effect by the above structure.

2. An anti-slip fastener driver 70g comprises a shank 80g and a driving portion 90g. The driving portion 90g is formed on an end of the shank 80g and defines a longitudinal axis L. The driving portion 90g includes an outer periphery surrounding the longitudinal axis L and having a first peripheral face 91g. An end of the driving portion 90g opposite to the shank 80g includes a front conical face 92g and a first end face 93g. The front conical face 92g is a conical face centered at the longitudinal axis L. The first end face 93g is connected to the first peripheral face 91g. The first end face 93g includes a first side 931g and a first angle 932g not located on the first side 931g. The first side 931g is located on the front conical face 92g. An end of the first side 931g is adjacent to the longitudinal axis L. Another end of the first side 931g opposite to the longitudinal axis L is connected to the first peripheral face 91g. The first angle 932g is located between the front conical face 92g and the shank 80g along the longitudinal axis L. The anti-slip fastener driver 70g provides an excellent anti-slip effect by the above structure.

[0045] Although specific embodiments have been illustrated and described, numerous modifications and variations are still possible without departing from the scope of the invention. The scope of the invention is limited by the accompanying claims.

Claims

1. An anti-slip fastener driver (10) comprising:

a shank (20;80g);
a driving portion (30;90g) formed on an end of the shank (20;80g) and defining a longitudinal axis (L), wherein the driving portion (30;90g) includes an outer periphery surrounding the longitudinal axis (L) and having a first peripheral face (31;91g), wherein an end of the driving portion (30;90g) opposite to the shank (20;80g) includes a first end face (32;93g) connected to the first peripheral face (31;91g), and wherein the first end face (32;93g) includes a first side (321;931g) and a first angle (322;932g).

2. The anti-slip fastener driver as claimed in the previous claim, wherein the first angle (322) is located outside of the first side (321), wherein the end of the driving portion (30) opposite to the shank (20) includes a reference plane (P) perpendicular to the longitudinal axis (L), wherein the first side (321) is located on the reference plane (P), wherein an end of the first side (321) is adjacent to the longitudinal

axis (L), wherein another end of the first side (321) opposite to the longitudinal axis (L) is connected to the first peripheral face (31), and wherein the first angle (322) is located between the reference plane (P) and the shank (20).

3. The anti-slip fastener driver as claimed in the previous claim, wherein the first peripheral face (31) extends in a direction parallel to the longitudinal axis (L), wherein the first end face (32) is connected to a first driving face (323) extending in a direction parallel to the longitudinal axis (L), wherein the first driving face (323) is connected to the first angle (322), wherein the first driving face (323) includes an angle located on the longitudinal axis (L), and wherein a side of the first driving face (323) distant to the first end face (32) is located on the reference plane (P).
4. The anti-slip fastener driver as claimed in the previous claim, wherein the outer periphery of the driving portion (30) surrounding the longitudinal axis (L) further includes a second peripheral face (311) extending in a direction parallel to the longitudinal axis (L), wherein the end of the driving portion (30) opposite to the shank (20) includes a second end face (33) connected to the second peripheral face (311), wherein the second peripheral face (311) is contiguous to the first peripheral face (31), wherein the second end face (33) includes a second side (331) and a second angle (332) located outside of the second side (331), wherein the second end face (33) is a planar face extending perpendicularly to the reference plane (P), wherein the second side (331) and the second angle (332) are located on the reference plane (P), wherein the end of the first side (321) adjacent to the longitudinal axis (L) has an end point located on the longitudinal axis (L), wherein an end of the second side (331) is connected to the first side (321), wherein an interconnection between the first side (321) and the second side (331) is located on the longitudinal axis (L), wherein another end of the second side (331) opposite to the longitudinal axis (L) is connected to the second peripheral face (311).
5. The anti-slip fastener driver as claimed in the previous claim, wherein the outer periphery of the driving portion (30) surrounding the longitudinal axis (L) further includes a third peripheral face (312), a fourth peripheral face (313), a fifth peripheral face (314), and a sixth peripheral face (315), wherein each of the third, fourth, fifth, and sixth peripheral faces (312-315) extends in a direction parallel to the longitudinal axis (L),

wherein the end of the driving portion (30) opposite to the shank (20) includes a third end face (34), a fourth end face (35), a fifth end face (36), and a sixth end face (37), wherein the third end

face (34) is connected to the third peripheral face (312), wherein the third peripheral face (312) is contiguous to the second peripheral face (311) and is located on a side of the second peripheral face (311) opposite to the first peripheral face (31), wherein the third end face (34) includes a third side (341) and a third angle (342) located outside of the third side (341), wherein the third side (341) is located on the reference plane (P), wherein the third side (341) is connected to the second end face, wherein an end of the third side (341) is connected to the first side (321), wherein an interconnection between the first side (321) and the third side (341) is located on the longitudinal axis (L), wherein another end of the third side (341) opposite to the longitudinal axis (L) is connected to the third peripheral face (312), wherein the third angle (342) is located between the reference plane P and the shank (20),

wherein the fourth end face (35) is connected to the fourth peripheral face (313), wherein the fourth peripheral face (313) is contiguous to the third peripheral face (312) and is located on a side of the third peripheral face (312) opposite to the second peripheral face (311), wherein the fourth peripheral face (313) is parallel to the first peripheral face (31), wherein the fourth end face (35) includes a fourth side (351) and a fourth angle (352) located outside of the fourth side (351), wherein the fourth peripheral face (313) is a planar face extending perpendicularly to the longitudinal axis (L), wherein the fourth side (351) and fourth angle (352) are located on the reference plane (P), wherein an end of the fourth side (351) is connected to the first side (321), wherein the first side (321) and the fourth side (351) are located on a same line, wherein an interconnection between the first side (321) and the fourth side (351) is located on the longitudinal axis (L), wherein another end of the fourth side (351) opposite to the longitudinal axis (L) is connected to the fourth peripheral face (313), wherein the fourth angle (352) is located between the reference plane P and the shank (20), wherein the fifth end face (36) is connected to the fifth peripheral face (314), wherein the fifth peripheral face (314) is contiguous to the fourth peripheral face (313) and is located on a side of the fourth peripheral face (313) opposite to the third peripheral face (312), wherein the fifth peripheral face (314) is parallel to the second peripheral face (311), wherein the fifth end face (36) includes a fifth side (361) and a fifth angle (362) located outside of the fifth side (361), wherein the fifth side (361) is located on the reference plane (P), wherein the fifth side (361) is connected to the fourth end face (35), wherein

an end of the fifth side (361) is connected to the second side (331), wherein an intersection between the second side (331) and the fifth side (361) is located on the longitudinal axis (L), wherein another end of the fifth side (361) opposite to the longitudinal axis (L) is connected to the fifth peripheral face (314), wherein the fifth angle (362) is located between the reference plane (P) and the shank (20), wherein the sixth end face (37) is connected to the sixth peripheral face (315), wherein the sixth peripheral face (315) is located between the first peripheral face (31) and the fifth peripheral face (314), wherein the sixth peripheral face (315) is parallel to the third peripheral face (312), wherein the first side is connected to the sixth end face, wherein the sixth end face (37) includes a sixth side (371) and a sixth angle (372) located outside of the sixth side (371), wherein the sixth end face is a planar face extending perpendicularly to the longitudinal axis, wherein the sixth side (371) and the sixth angle are located on the reference plane (P), wherein an end of the sixth side (371) is connected to the third side (341), wherein the third side (341) and the sixth side (371) are on a same line, wherein an interconnection between the third side (341) and the sixth side (371) is located on the longitudinal axis (L), wherein another end of the sixth side (371) opposite to the longitudinal axis (L) is connected to the sixth peripheral face (315), wherein the sixth angle (372) is located between the reference plane (P) and the shank (20), wherein the third end face (34) is connected to a second driving face (343) extending in a direction parallel to the longitudinal axis (L), wherein the second driving face (343) is connected to the third angle (342), wherein the second driving face (343) has an angle located on the longitudinal axis (L), wherein a side of the second driving face (343) distant to the third end face (34) is located on the reference plane (P), wherein the fourth side (351) is connected to the second driving face (343), wherein the fifth end face (36) is connected to a third driving face (363) extending in a direction parallel to the longitudinal axis (L), wherein the third driving face (363) is connected to the fifth angle (362), wherein the third driving face (363) has an angle located on the longitudinal axis (L), wherein a side of the third driving face (363) distant to the fifth end face (36) is located on the reference plane (P), and wherein the sixth side (371) is connected to the third driving face (363), and wherein preferably each of the first end face (32), the third end face (34), and the fifth end face (36) is a slant face at a non-parallel angle to the reference plane (P), or wherein preferably each two adjacent

ones of the first, second, third, fourth, fifth, and sixth peripheral faces (31, 311, 312, 313, 314, 315) have an inner angle of 120° therebetween.

- 5 6. The anti-slip fastener driver as claimed in claim 2, wherein the end of the first side (321c) adjacent to the longitudinal axis (L) has an end point not located on the longitudinal axis (L), wherein the first end face (32c) is connected to a first driving face (323c) extending in a direction parallel to the longitudinal axis (L), wherein the first driving face (323c) is connected to a first angle (322c), wherein the first driving face (323c) does not intersect with the longitudinal axis (L), and wherein a side of the first driving face (323c) distant to the first end face (32c) is located on the reference plane (P).
- 10 7. The anti-slip fastener driver as claimed in the previous claim, wherein the outer periphery of the driving portion (30) surrounding the longitudinal axis (L) further includes a second peripheral face (311) extending in a direction parallel to the longitudinal axis (L), wherein the end of the driving portion (30) opposite to the shank (20) further includes a second end face (33) connected to the second peripheral face (311), wherein the second peripheral face (311) is contiguous to the first peripheral face (31), wherein the second end face (33) includes a second side (331) and a second angle (332) located outside of the second side (331), wherein the second side (331c) is located on the reference plane (P), wherein an end of the second side is adjacent to the longitudinal axis (L) and has an end point not located on the longitudinal axis (L), wherein another end of the second side (331) opposite to the longitudinal axis (L) is connected to the second peripheral side (311), and wherein the second angle (332) is located between the reference plane (P) and the shank (20).
- 15 20 25 30 35 40 45 50 8. The anti-slip fastener driver as claimed in the previous claim, wherein the outer periphery of the driving portion (30) surrounding the longitudinal axis (L) includes a third peripheral face (312), a fourth peripheral face (313), a fifth peripheral face (314), and a sixth peripheral face (315), wherein each of the third peripheral face (312), the fourth peripheral face (313), the fifth peripheral face (314), and the sixth peripheral face (315) extends in a direction parallel to the longitudinal axis (L),

wherein the end of the driving portion (30) opposite to the shank (20) includes a third end face (34), a fourth end face (35), a fifth end face (36), and a sixth end face (37), wherein the third end face (34) is connected to the third peripheral face (312), wherein the third peripheral face (312) is contiguous to the second peripheral face (311) and is located on a side of the second peripheral

face (311) opposite to the first peripheral face (31), wherein the third end face (34) includes a third side (341) and a third angle (342) located outside of the third side (341), wherein the third side (341) is located on the reference plane (P), wherein an end of the third side (341) adjacent to the longitudinal axis (L) has an end point located outside of the longitudinal axis (L), wherein another end of the third side (341) opposite to the longitudinal axis (L) is connected to the third peripheral face (312), wherein the third angle (342) is located between the reference plane (P) and the shank (20), wherein the fourth end face (35) is connected to the fourth peripheral face (313), wherein the fourth peripheral face (313) is contiguous to the third peripheral face (312) and is located on a side of the third peripheral face (312) opposite to the second peripheral face (311), wherein the fourth peripheral face (313) is parallel to the first peripheral face (31), wherein the fourth end face (35) includes a fourth side (351) and a fourth angle (352) located outside of the fourth side (351), wherein the fourth side (351) is located on the reference plane (P), wherein an end of the fourth side 351c adjacent to the longitudinal axis (L) has an end point is located outside of the longitudinal axis (L), wherein another end of the fourth side (351) opposite to the longitudinal axis (L) is connected to the fourth peripheral face (313), wherein the fourth angle (352) is located between the reference plane (P) and the shank (20), wherein the fifth end face (36) is connected to the fifth peripheral face (314), wherein the fifth peripheral face (314) is contiguous to the fourth peripheral face (313) and is located on a side of the fourth peripheral face (313) opposite to the third peripheral face (312), wherein the fifth peripheral face (314) is parallel to the second peripheral face (311), wherein the fifth end face (36) includes a fifth side (361) and a fifth angle (362) located outside of the fifth side (361), wherein the fifth side (361) is located on the reference plane (P), wherein an end of the fifth side (361) is adjacent to the longitudinal axis and has an end point located outside of the longitudinal axis (L), wherein another end of the fifth side (361) opposite to the longitudinal axis (L) is connected to the fifth peripheral face (314), wherein the fifth angle (362) is located between the reference plane (P) and the shank (20), wherein the sixth end face (37) is connected to the sixth peripheral face (315), wherein the sixth peripheral face (315) is located between the first peripheral face (31) and the fifth peripheral face (314), wherein the sixth peripheral face (315) is parallel to the third peripheral face (312), where-

in the sixth end face (37) includes a sixth side (371) and a sixth angle (372) located outside of the sixth side (371), wherein the sixth side (371) is located on the reference plane (P), wherein an end of the sixth side (371) is adjacent to the longitudinal axis (L) and has an end point located outside of the longitudinal axis (L), wherein another end of the sixth side (371) opposite to the longitudinal axis (L) is connected to the sixth peripheral face (315), wherein the sixth angle (372) is located between the reference plane (P) and the shank (20), wherein the second end face (33c) is located on a side of the first driving face (323c) opposite to the first end face (32c) and is not connected to the first driving face (323c), wherein the second side (331c) is located on a side of the second end face (33c) adjacent to the first driving face (323c), the third end face (34) is connected to a second driving face (343) extending in a direction parallel to the longitudinal axis (L), wherein the second driving face (343) is connected to the third angle (342), wherein the second driving face (343) does not intersect with the longitudinal axis (L), wherein a side of the second driving face (343c) distant to the third end face (34c) is located on the reference plane (P), wherein the fourth end face (35) is located on a side of the second driving face (343) opposite to the third end face (34) and does not intersect with the second driving face (343), wherein the fourth side (351) is located on a side of the fourth end face (35) adjacent to the second driving face (343), wherein the fifth end face (36) is connected to a third driving face (363) extending in a direction parallel to the longitudinal axis (L), wherein the third driving face (363) is connected to the fifth angle (362), wherein the third driving face (363) does not intersect with the longitudinal axis (L), wherein a side of the third driving face (363c) distant to the fifth end face (36c) is located on the reference plane (P), wherein the sixth end face (37c) is located on a side of the third driving face (363c) opposite to the fifth end face (36c) and does not intersect with the third driving face (363c), wherein the sixth side (371c) is located on a side of the sixth end face (37c) adjacent to the third driving face (363c), wherein the second end face (33) is connected to a fourth driving face (333) extending in a direction parallel to the longitudinal axis (L), wherein the fourth driving face (333) is connected to the second angle (332), wherein the fourth driving face (333) does not intersect with the longitudinal axis (L), wherein a side of the fourth driving face (333) distant to the second end face (33) is located on the reference plane (P), wherein the third end face is located on a side

of the fourth driving face opposite to the first end face and does not intersect with the fourth driving face, wherein the third side (341) is located on a side of the third end face adjacent to the fourth driving face (333),

wherein the fourth end face (35) is connected to a fifth driving face (353) extending in a direction parallel to the longitudinal axis (L), wherein the fifth driving face (353) is connected to the fourth angle and does not intersect with the longitudinal axis (L), wherein a side of the fifth driving face (353) distant to the fourth end face (35) is located on the reference plane (P), wherein the fifth end face (36) is located on a side of the fifth driving face (353) opposite to the fourth end face (35) and does not intersect with the fifth driving face (353),

wherein the fifth side (361) is located on a side of the fifth end face (35) adjacent to the fifth driving face (353), wherein the sixth end face (37) is connected to a sixth driving face (373c) extending in a direction parallel to the longitudinal axis (L), wherein the sixth driving face (373) is connected to the sixth angle (372), wherein the sixth driving face (373c) does not intersect with the longitudinal axis (L), wherein a side of the sixth driving face (373) distant to the sixth end face (37) is located on the reference plane (P), wherein the first end face (32c) is located on a side of the sixth driving face opposite to the sixth end face and does not intersect with the sixth driving face (373c), and wherein the first side (321) is located on a side of the first end face (32c) adjacent to the sixth driving face (373c).

9. The anti-slip fastener driver as claimed in the previous claim, wherein the end of the driving portion (30c) opposite to the shank (20c) includes a seventh end face (38c), wherein the seventh end face (38c) is a planar face extending perpendicularly to the longitudinal axis (L) and is located on the reference plane (P), wherein the seventh end face (38c) is connected to the first end face (32c), the first driving face (323c), the second end face (33c), the second driving face (343c), the third end face (34c), the third driving face (363c), the fourth end face (35c), the fourth driving face (333c), the fifth end face (36c), the fifth driving face (353c), the sixth end face (37c), and the sixth driving face (373c), and wherein an outer periphery of the seventh end face (38c) surrounding the longitudinal axis (L) is connected to the first peripheral face (31c), the second peripheral face (311c), the third peripheral face (312c), the fourth peripheral face (313c), the fifth peripheral face (314c), and the sixth peripheral face (315c), and wherein preferably each of the first, second, third, fourth, fifth, and sixth end faces (32c-37c) is a slant face at a non-parallel angle to the reference plane (P), or wherein , wherein

a side of the first driving face (323e) connected to the seventh end face (38e) intersects with the first side (321e), wherein the side of the first driving face (323e) and the first side (321e) have a first angle (A1) therebetween, wherein a side of the fourth driving face (333e) connected to the seventh end face (38e) intersects with the second side (331e), wherein the side of the fourth driving face (333e) and the second side (331e) have a second angle (A2) therebetween, wherein a side of the second driving face (343e) connected to the seventh end face 38e intersects with the third side (341e), wherein the side of the second driving face (343e) and the third side (341e) have a third angle (A3) therebetween, wherein a side of the fifth driving face (353e) connected to the seventh end face (38e) intersects with the fourth side (351e), wherein the side of the fifth driving face (353e) and the fourth side (351e) have a fourth angle (A4) therebetween, wherein a side of the third driving face (363e) connected to the seventh end face (38e) intersects with the fifth side (361e), wherein the side of the third driving face (363e) and the fifth side (361e) have a fifth angle (A6) therebetween, wherein a side of the sixth driving face (373e) connected to the seventh end face (38e) intersects with the sixth side (371e), wherein the side of the sixth driving face (373e) and the sixth side (371e) have a sixth angle (A6) therebetween, and wherein each of the first angle (A1), the second angle (A2), the third angle (A3), the fourth angle (A4), the fifth angle (A5), and the sixth angle (A6) is larger than 80°.

10. The anti-slip fastener driver as claimed in claim 6, wherein the first peripheral face (31e) has a lateral width (W) in a radial direction perpendicular to the longitudinal axis (L), wherein an end of the first side (321e) adjacent to the longitudinal axis (L) and another end of the first side (321e) connected to the first peripheral face (31e) have a first length (L1) therebetween, and wherein the first length (L1) is smaller than 0.5 times the lateral width (W).
11. The anti-slip fastener driver as claimed in claim 8, wherein the first peripheral face (31e) has a lateral width (W) in a radial direction perpendicular to the longitudinal axis (L), wherein an end of the first side (321e) adjacent to the longitudinal axis (L) and another end of the first side (321e) connected to the first peripheral face (31e) have a first length (L1) therebetween, wherein an end of the second side (331e) adjacent to the longitudinal axis (L) and another end of the second side (331e) connected to the second peripheral face (311e) have a second length (L2) therebetween, wherein an end of the third side (341e) adjacent to the longitudinal axis (L) and another end of the third side (341e) connected to the third peripheral face (312e) have a third length (L3) therebetween, wherein an end of the fourth side

- (351e) adjacent to the longitudinal axis (L) and another end of the fourth side (351e) connected to the fourth peripheral face (313e) have a fourth length (L4) therebetween, wherein an end of the fifth side (361e) adjacent to the longitudinal axis (L) and another end of the fifth side (361e) connected to the fifth peripheral face (314e) have a fifth length (L5) therebetween, wherein an end of the sixth side (371e) adjacent to the longitudinal axis (L) and another end of the sixth side (371e) connected to the sixth peripheral face (315e) have a sixth length (L6) therebetween, and wherein each of the first length (L1), the second length (L2), the third length (L3), the fourth length L4, the fifth length (L5), and the sixth length (L6) is smaller than 0.5 times the lateral width (W).
12. The anti-slip fastener driver as claimed in any of the previous claims, wherein an end of the driving portion (90g) opposite to the shank (80g) includes a front conical face (92g), wherein the front conical face (92g) is a conical face centered at the longitudinal axis (L), wherein the first angle (932g) is not located on the first side (931g), wherein the first side (931g) is located on the front conical face (92g), wherein an end of the first side (931g) is adjacent to the longitudinal axis (L), wherein another end of the first side (931g) opposite to the longitudinal axis (L) is connected to the first peripheral face (91g), and wherein the first angle 932g is located between the front conical face (92g) and the shank (80g) along the longitudinal axis (L).
13. The anti-slip fastener driver as claimed in the previous claim, wherein the first peripheral face (91g) extending in a direction parallel to the longitudinal axis (L), wherein an end of the first side (931g) adjacent to the longitudinal axis (L) has an end point not located on the longitudinal axis (L), wherein the first end face (93g) is connected to a first driving face (933g) extending in a direction parallel to the longitudinal axis (L), wherein the first driving face (933g) is connected to the first angle (932g), wherein the first driving face (933g) does not intersect with the longitudinal axis (L), and wherein a side of the first driving face (933g) distant to the first end face (93g) is located on the front conical face (92g).
14. The anti-slip fastener driver as claimed in the previous claim, wherein the outer periphery of the driving portion (90g) surrounding the longitudinal axis (L) further includes a second peripheral face (911g) extending in a direction parallel to the longitudinal axis (L), wherein the end of the driving portion (90g) opposite to the shank (80g) further includes a second end face (94g) connected to the second peripheral face (911g), wherein the second peripheral face (911g) is contiguous to the first peripheral face (91g), wherein the second end face (94g) includes a second side (941g) and a second angle (942g) located outside of the second side (941g), wherein the second side (941g) is located on the front conical face (92g), wherein an end of the second side (941g) is adjacent to the longitudinal axis (L) and has an end point not located on the longitudinal axis (L), wherein another end of the second side (941g) opposite to the longitudinal axis (L) is connected to the second peripheral face (911g), and wherein the second angle (942g) is located between the front conical face (92g) and the shank 80g along the longitudinal axis (L).
15. The anti-slip fastener driver as claimed in the previous claim, wherein the outer periphery of the driving portion (90g) surrounding the longitudinal axis (L) further includes a third peripheral face (912g), a fourth peripheral face (913g), a fifth peripheral face (914g), and a sixth peripheral face (915g), wherein each of the third, fourth, fifth, and sixth peripheral faces (912g-915g) extends in a direction parallel to the longitudinal axis (L), wherein the end of the driving portion (90g) opposite to the shank (80g) further includes a third end face (95g), a fourth end face (96g), a fifth end face (97g), and a sixth end face (98g), wherein the third end face (95g) is connected to the third peripheral face (912g), wherein the third peripheral face (912g) is contiguous to the second peripheral face (911g) and is located on a side of the second peripheral face (911g) opposite to the first peripheral face (91g), wherein the third end face (95g) includes a third side (951g) and a third angle (952g) located outside of the third side (951g), wherein the third side (951g) is located on the front conical face (92g), wherein an end of the third side (951g) is adjacent to the longitudinal axis (L) and has an end point not located on the longitudinal axis (L), wherein another end of the third side (951g) opposite to the longitudinal axis (L) is connected to the third peripheral face (912g), wherein the third angle (952g) is located between the front conical face (92g) and the shank (80g) along the longitudinal axis (L), wherein the fourth end face (96g) is connected to the fourth peripheral face (913g), wherein the fourth peripheral face (913g) is contiguous to the third peripheral face (912g) and is located on a side of the third peripheral face (912g) opposite to the second peripheral face (911g), wherein the fourth peripheral face (913g) is parallel to the first peripheral face (91g), wherein the fourth end face (96g) includes a fourth side (961g) and a fourth angle (962g) located outside of the fourth side (961g), wherein the fourth side

(961g) is located on the front conical face (92g), wherein an end of the fourth side (961g) is adjacent to the longitudinal axis (L) and has an end point not located on the longitudinal axis (L), wherein another end of the fourth side (961g) opposite to the longitudinal axis (L) is connected to the fourth peripheral face (913g), wherein the fourth angle (962g) is located between the front conical face (92g) and the shank (80g) along the longitudinal axis (L), wherein the fifth end face (97g) is connected to the fifth peripheral face (914g), wherein the fifth peripheral face (914g) is contiguous to the fourth peripheral face (913g) and is located on a side of the fourth peripheral face (913g) opposite to the third peripheral face (912g), wherein the fifth peripheral face (914g) is parallel to the second peripheral face (911g), wherein the fifth end face (97g) includes a fifth side (971g) and a fifth angle (972g) located outside of the fifth side (971g), wherein the fifth side (971g) is located on the front conical face (92g), wherein an end of the fifth side (971g) is adjacent to the longitudinal axis (L) and has an end point not located on the longitudinal axis (L), wherein another end of the fifth side (971g) opposite to the longitudinal axis (L) is connected to the fifth peripheral face (914g), wherein the fifth angle (972g) is located between the front conical face (92g) and the shank (80g) along the longitudinal axis (L), wherein the sixth end face (98g) is connected to the sixth peripheral face (915g), wherein the sixth peripheral face (915g) is located between the first peripheral face (91g) and the fifth peripheral face (914g), wherein the sixth peripheral face (915g) is parallel to the third peripheral face (912g), wherein the sixth end face (98g) includes a sixth side (981g) and a sixth angle (982g) located outside of the sixth side (981g), wherein the sixth side (981g) is located on the front conical face (92g), wherein an end of the sixth side (981g) is adjacent to the longitudinal axis (L) and has an end point not located on the longitudinal axis (L), wherein another end of the sixth side (981g) opposite to the longitudinal axis (L) is connected to the sixth peripheral face (915g), wherein the sixth angle (982g) is located between the front conical face (92g) and the shank (80g) along the longitudinal axis (L), wherein the second end face (94g) is located on a side of the first driving face (933g) opposite to the first end face (93g) and does not intersect with the first driving face (933g), wherein the second side (941g) is located on a side of the second end face (94g) adjacent to the first driving face (933g), wherein the third end face (95g) is connected to a second driving face (953g) extending in a di-

rection parallel to the longitudinal axis (L), wherein the second driving face (953g) is connected to the third angle (952g), wherein the second driving face (953g) does not intersect with the longitudinal axis (L), wherein a side of the second driving face (953g) distant to the third end face (95g) is located on the front conical face (92g), wherein the fourth end face (96g) is located on a side of the second driving face (96g) opposite to the third driving face (95g) and does not intersect with the second driving face (953g), wherein the fourth side (961g) is located on a side of the fourth end face adjacent to the second driving face (953g),

wherein the fifth end face (97g) is connected to a third driving face (973g) extending in a direction parallel to the longitudinal axis (L), wherein the third driving face (973g) is connected to the fifth angle (972g), wherein the third driving face (973g) does not intersect with the longitudinal axis (L), wherein a side of the third driving face (973g) distant to the fifth end face (97g) is located on the front conical face (92g), wherein the sixth end face (98g) is located on a side of the third driving face (973g) opposite to the fifth end face (97g) and does not intersect with the third driving face (973g), wherein the sixth side (981g) is located on a side of the sixth end face (98g) adjacent to the third driving face (973g),

wherein the second end face (94g) is connected to a fourth driving face (943g) extending in a direction parallel to the longitudinal axis (L), wherein the fourth driving face (943g) is connected to the second angle (942g), wherein the fourth driving face (943g) does not intersect with the longitudinal axis (L), wherein a side of the fourth driving face (943g) distant to the second end face (94g) is located on the front conical face (92g), wherein the third end face (95g) is located on a side of the fourth driving face (943g) opposite to the first end face (93g) and does not intersect with the fourth driving face (943g), wherein the third side (951g) is located on a side of the third end face (95g) adjacent to the fourth driving face (943g),

wherein the fourth end face (96g) is connected to a fifth driving face (963g) extending in a direction parallel to the longitudinal axis (L), wherein the fifth driving face (963g) is connected to the fourth angle (962g), wherein the fifth driving face (963g) does not intersect with the longitudinal axis (L), wherein a side of the fifth driving face (963g) distant to the fourth end face (96g) is located on the front conical face (92g), wherein the fifth end face (97g) is located on a side of the fifth driving face (963g) opposite to the fourth end face (96g) and does not intersect with the fifth driving face (963g), wherein the fifth

side (971g) is located on a side of the fifth end
 face (97g) adjacent to the fifth driving face
 (963g), wherein the sixth end face (98g) is con-
 nected to a sixth driving face (983g) extending
 in a direction parallel to the longitudinal axis (L),
 wherein the sixth driving face (983g) is connect-
 ed to the sixth angle (982g), wherein the sixth
 driving face (983g) does not intersect with the
 longitudinal axis (L), wherein a side of the sixth
 driving face (983g) distant to the sixth end face
 (98g) is located on the front conical face (92g),
 wherein the first end face (93g) is located on a
 side of the sixth driving face (983g) opposite to
 the sixth end face 98g and does not interest with
 the sixth driving face (983g), and wherein the
 first side (931g) is located on a side of the first
 end face (93g) adjacent to the sixth driving face
 (983g), and wherein preferably the end of the
 driving portion (90g) opposite to the shank (80g)
 has a front face (99g), wherein the front face
 (99g) is a circular face orthogonal to the longi-
 tudinal axis (L) and centered at the longitudinal
 axis (L), and wherein the front conical face (92g)
 surrounds the front face (99g), wherein prefer-
 ably each of the first, second, third, fourth, fifth,
 and sixth end faces (93g-98g) is a slant face not
 perpendicular to the longitudinal axis, or wherein
 preferably each two adjacent ones of the first,
 second, third, fourth, fifth, and sixth peripheral
 faces (91g,911g-915g) have an inner angle of
 120° therebetween.

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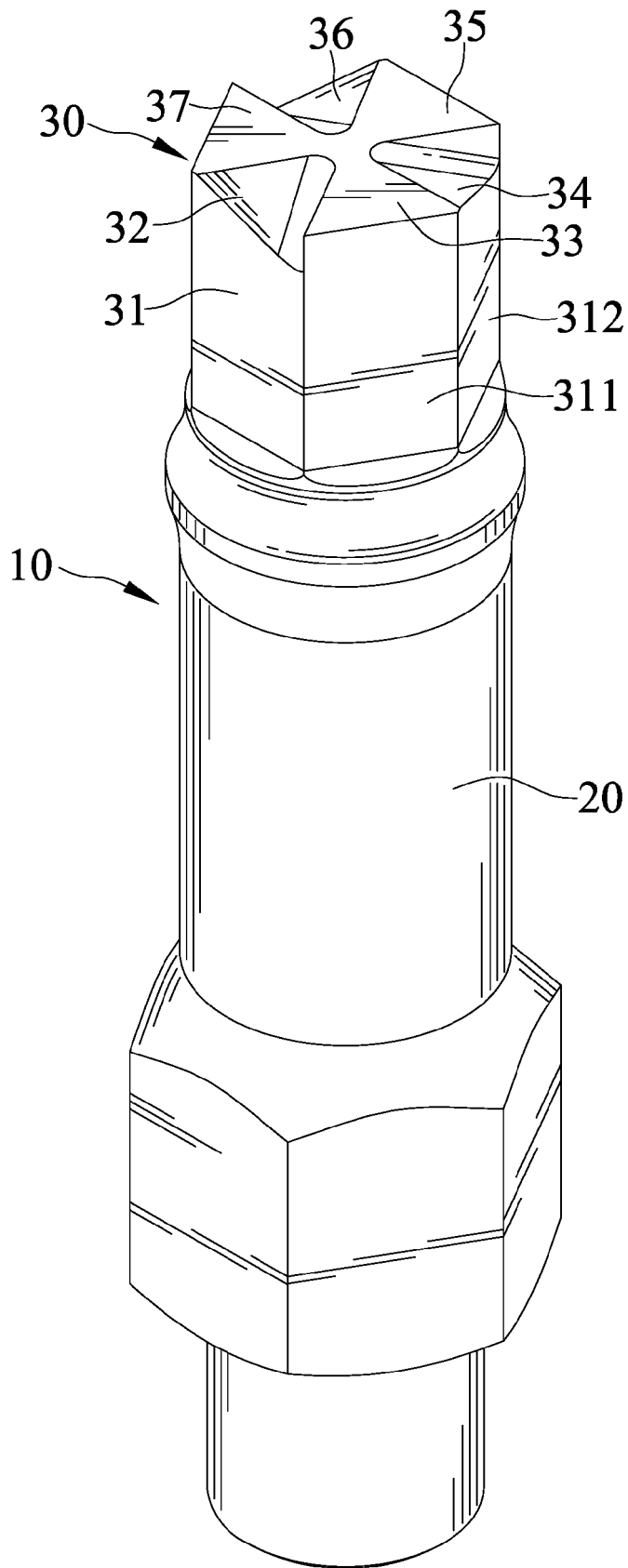


FIG. 1

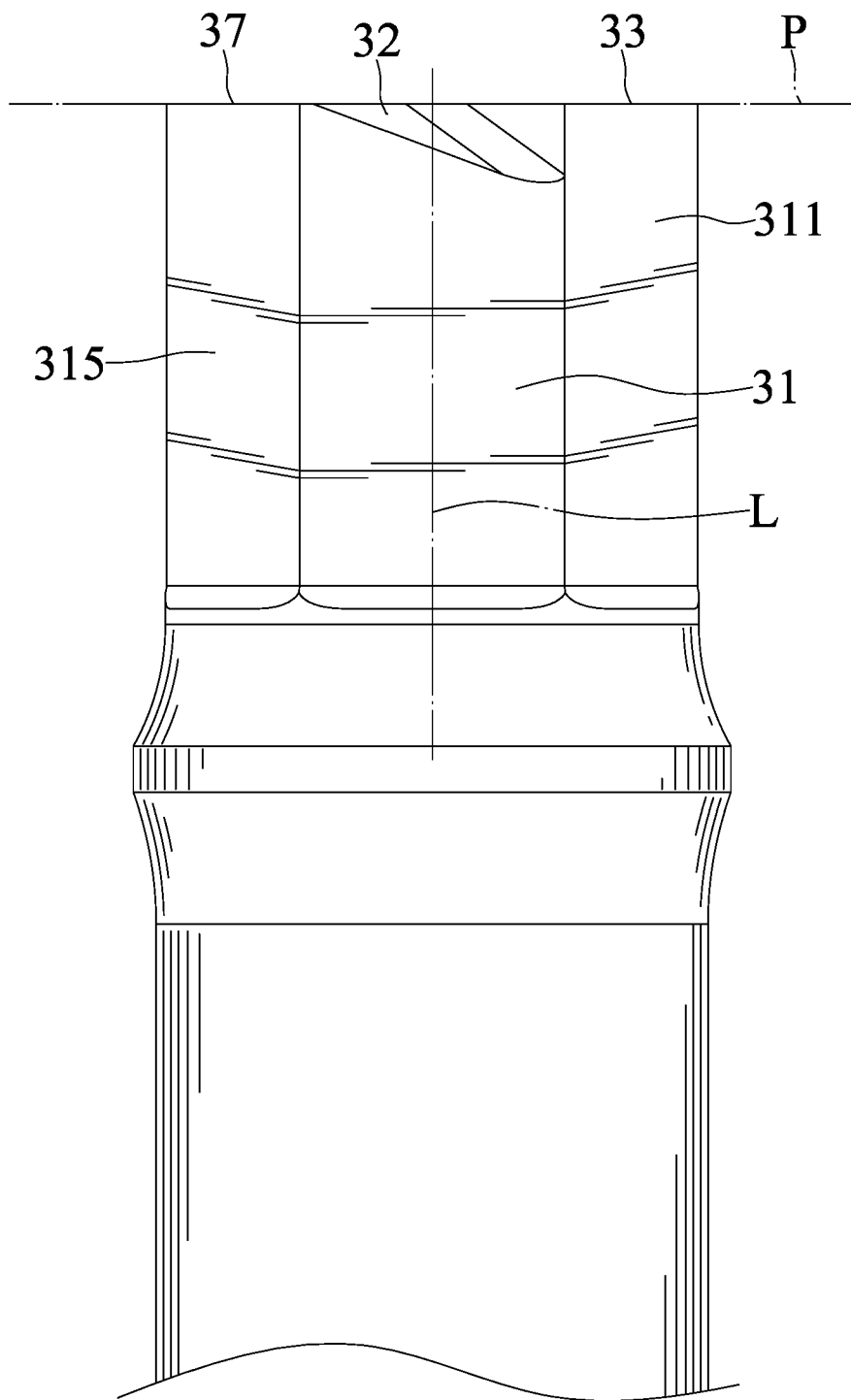


FIG. 2

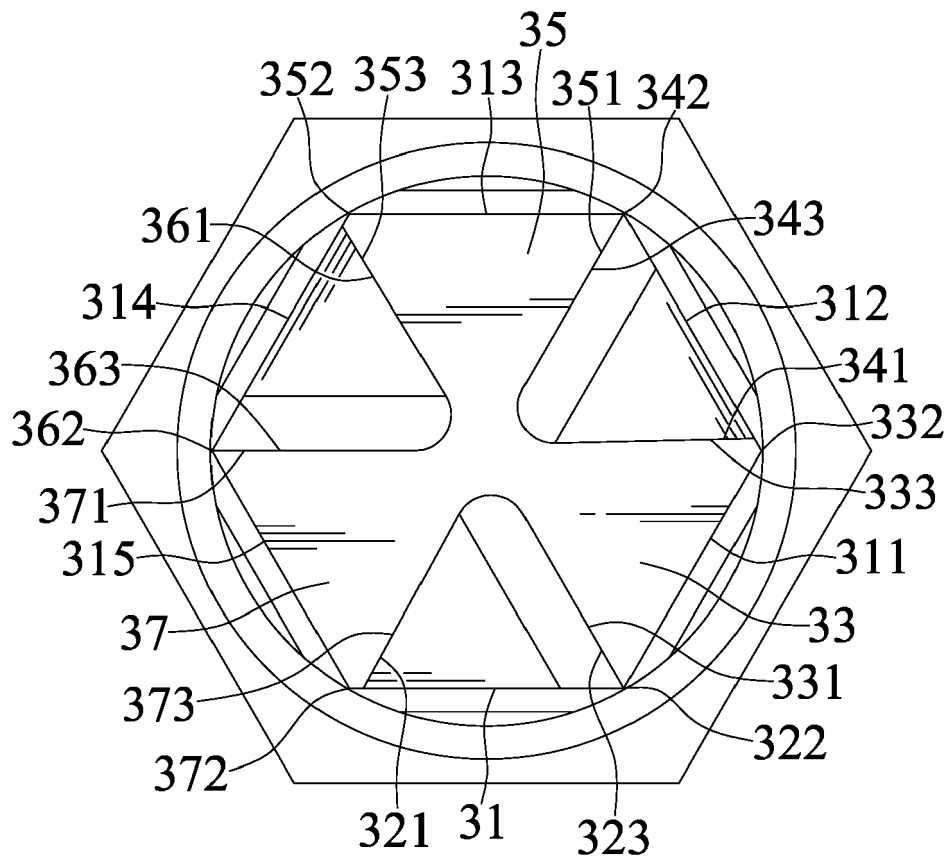


FIG. 3

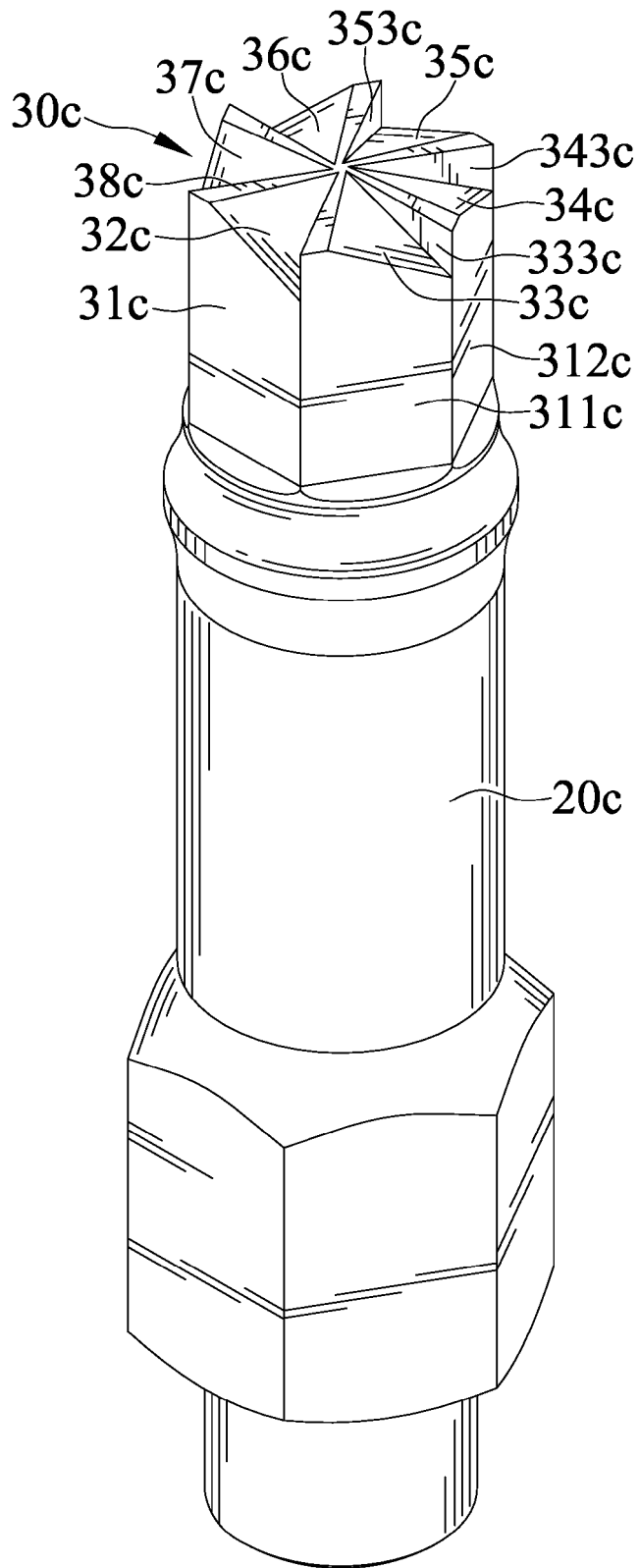


FIG. 4

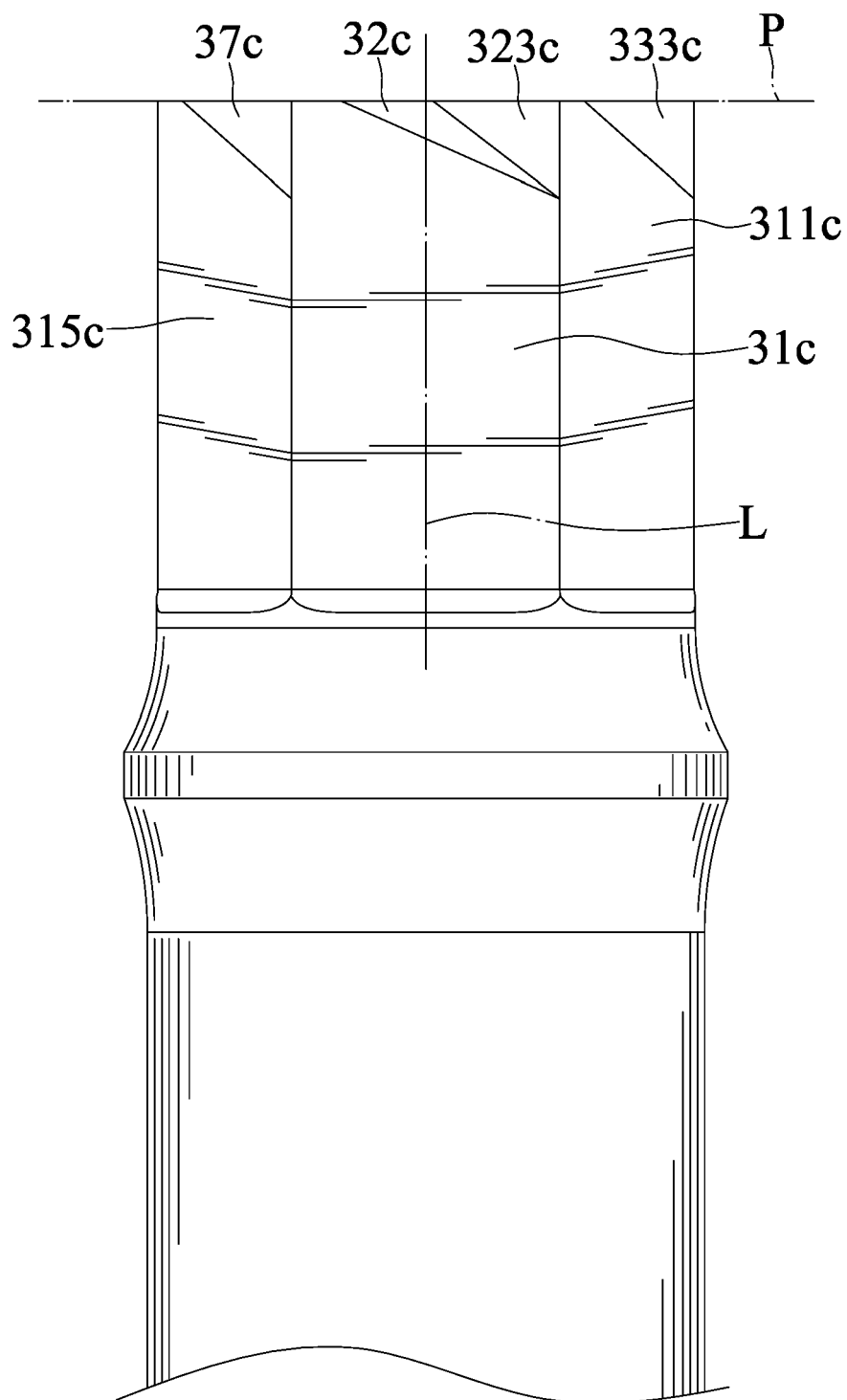


FIG. 5

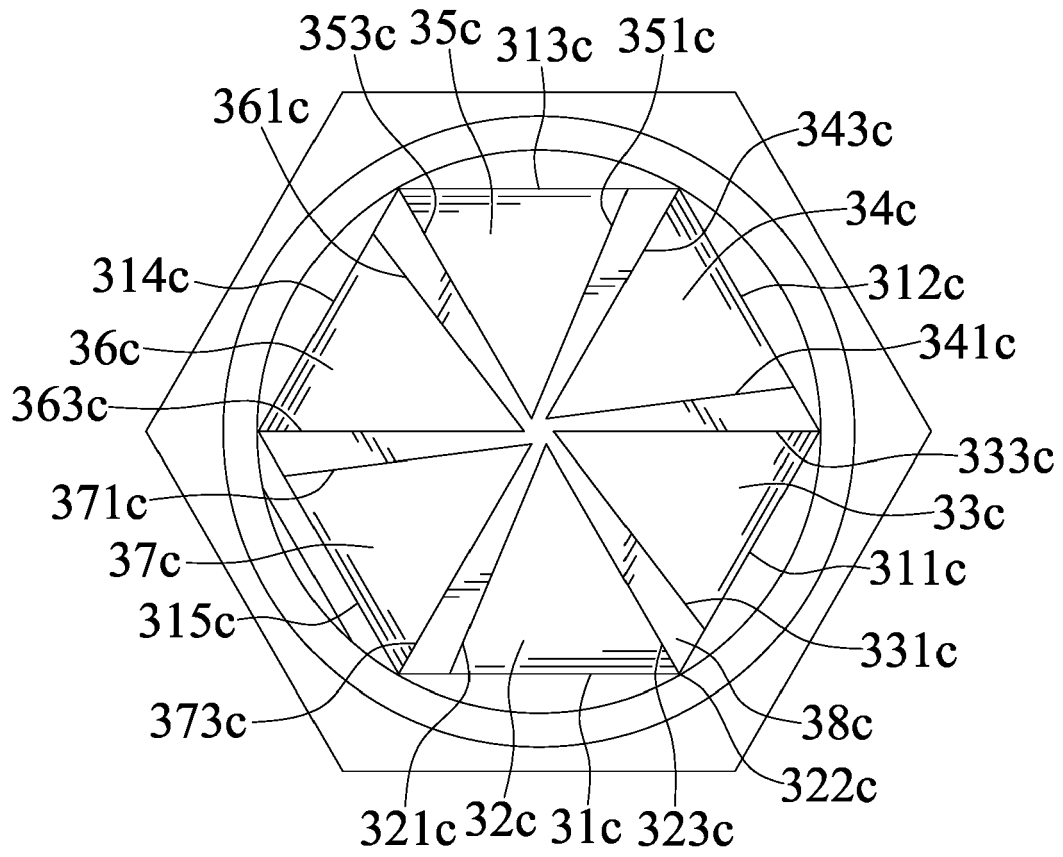


FIG. 6

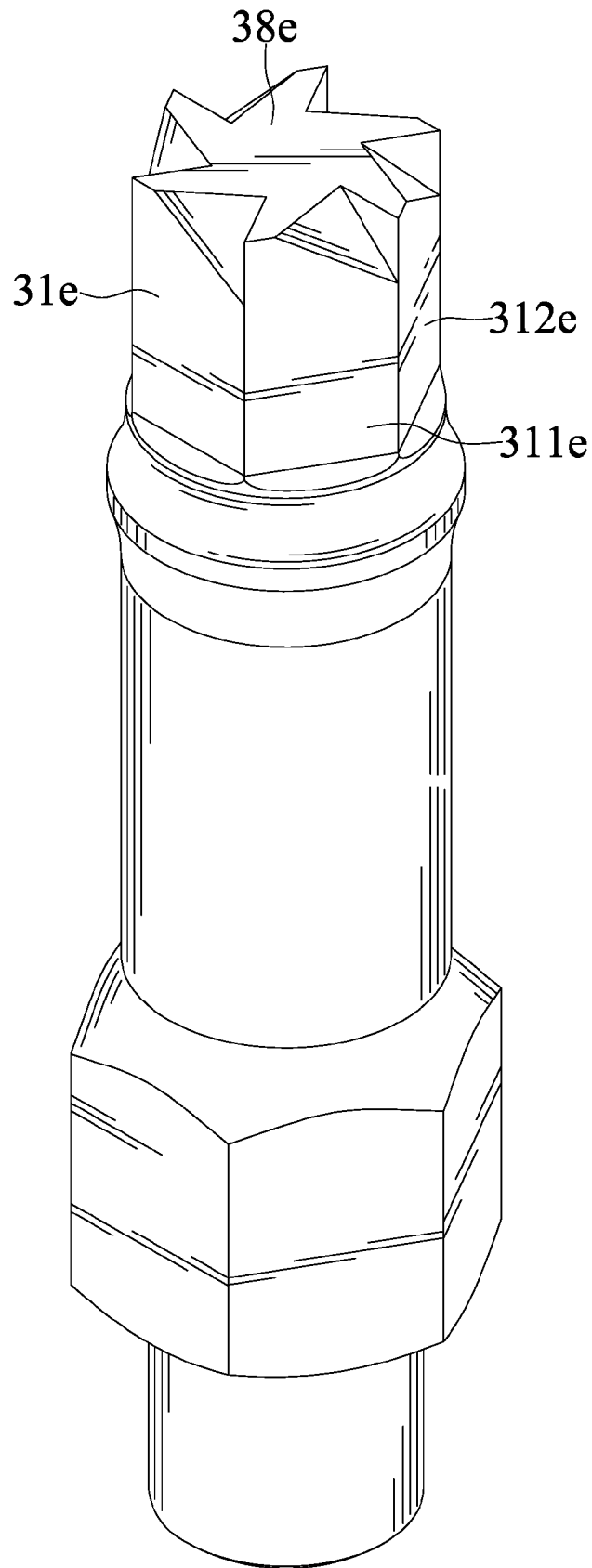


FIG. 7

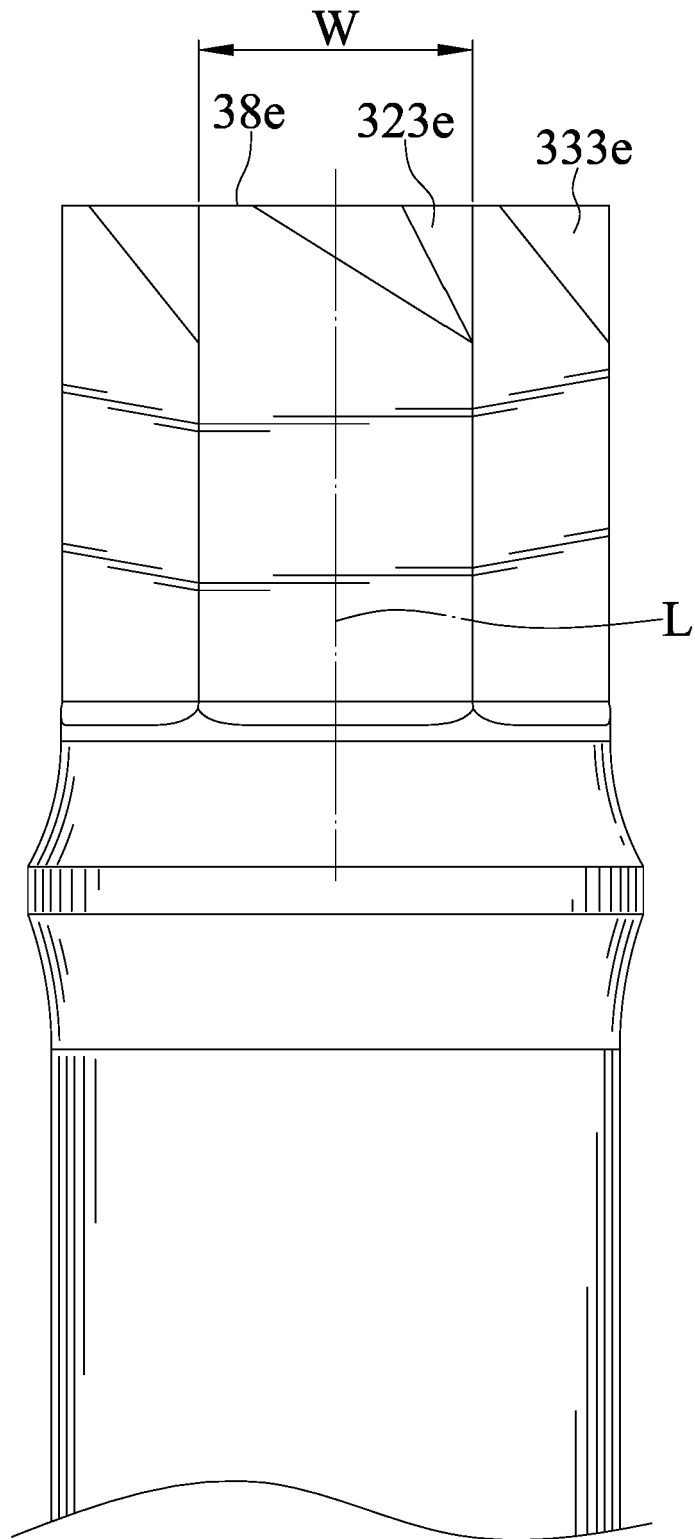


FIG. 8

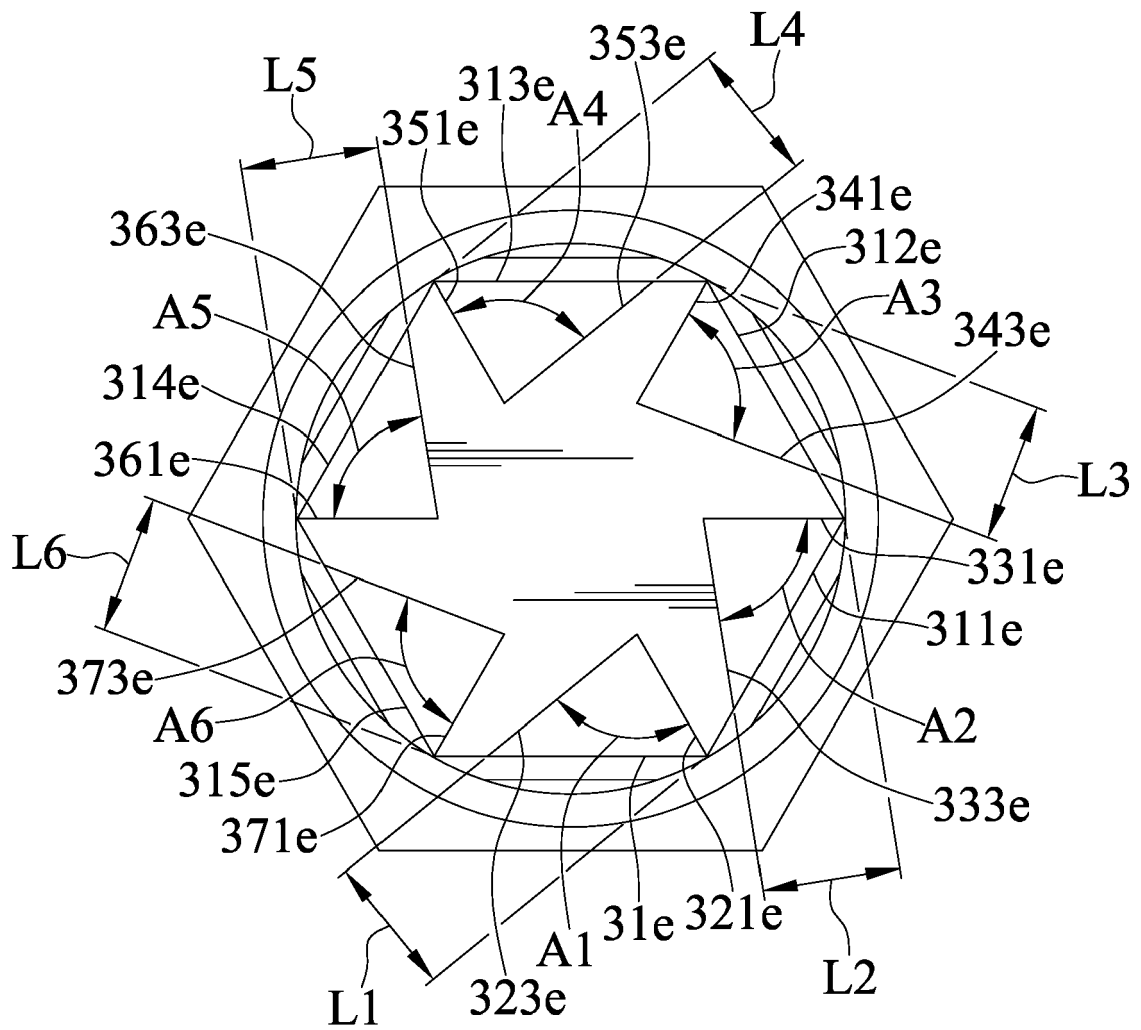


FIG. 9

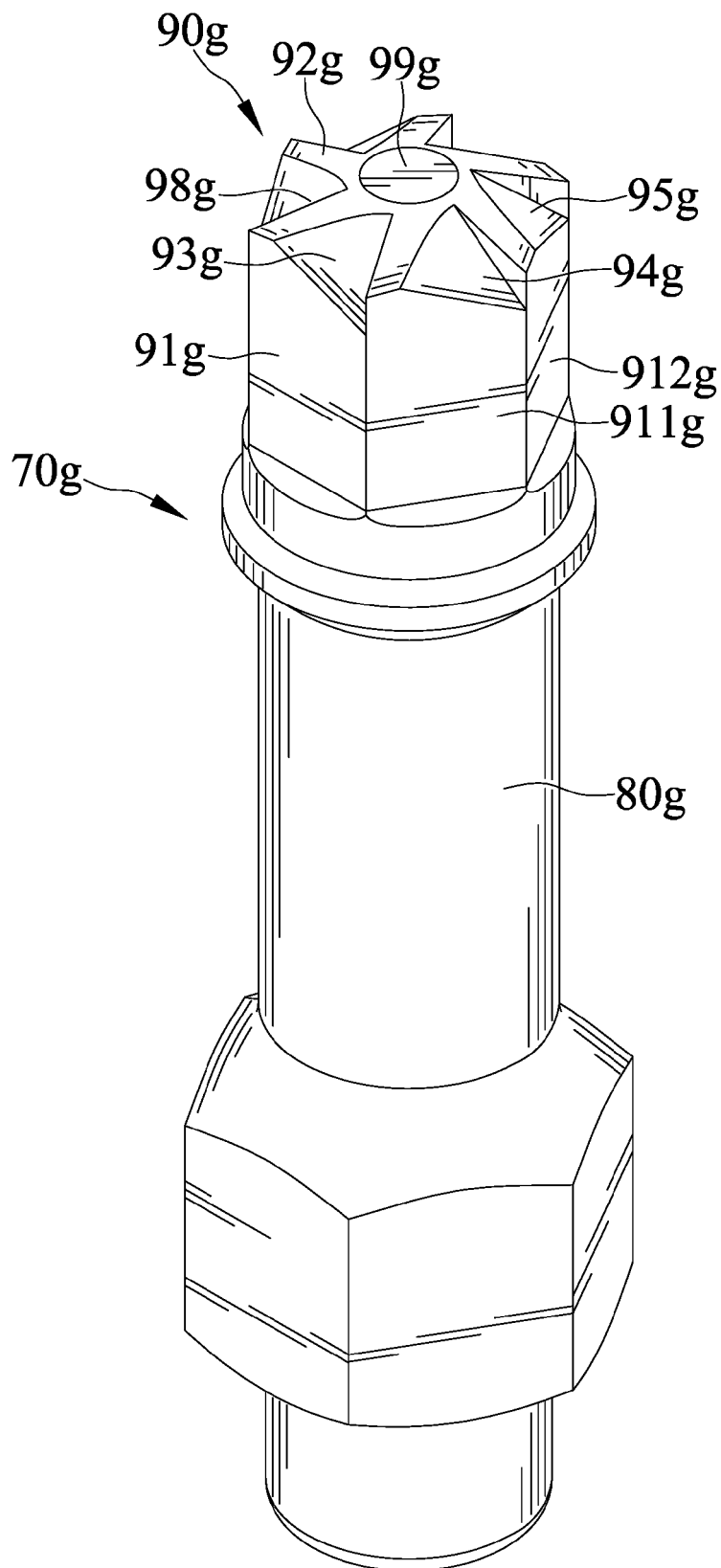


FIG. 10

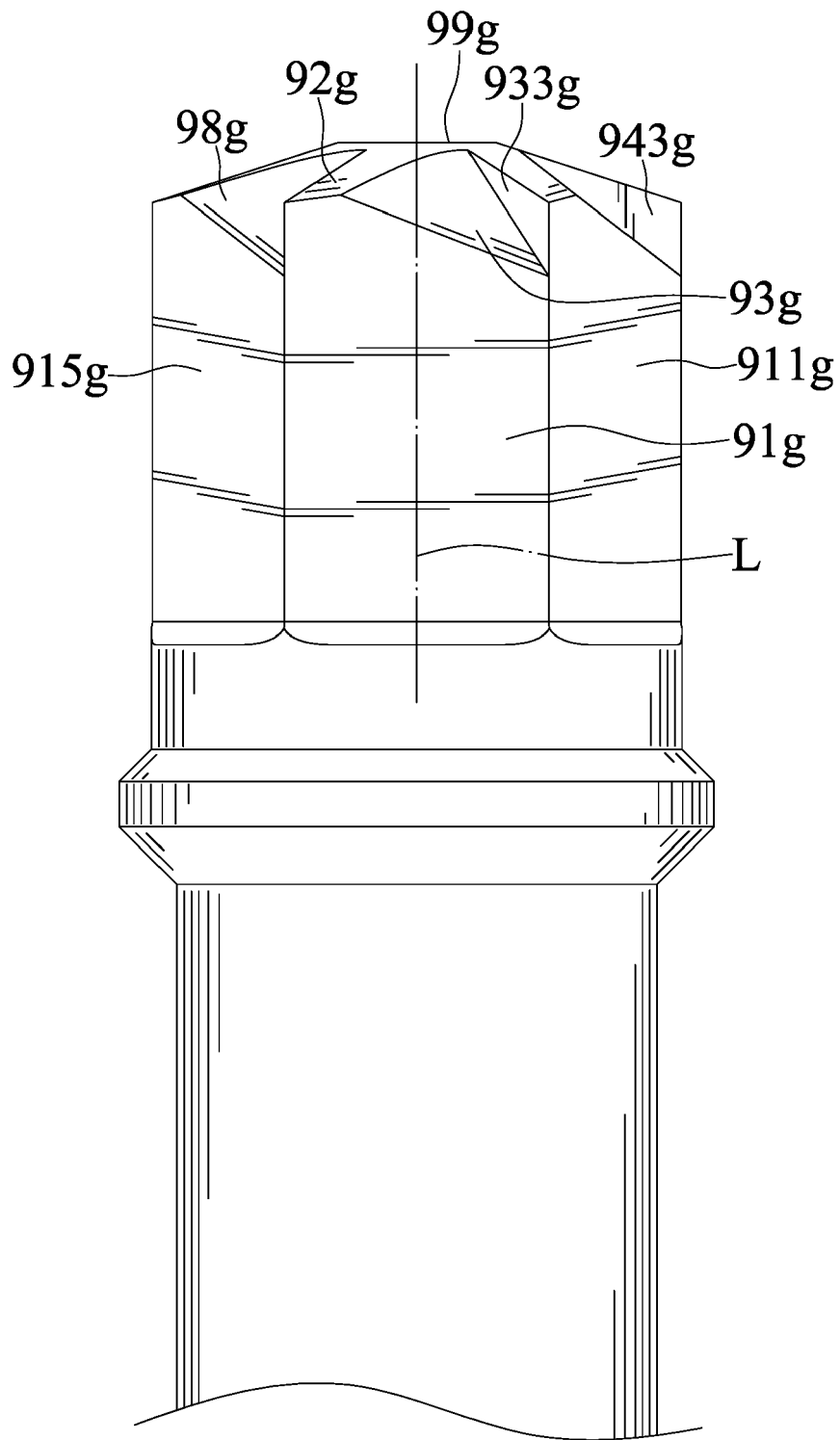


FIG. 11

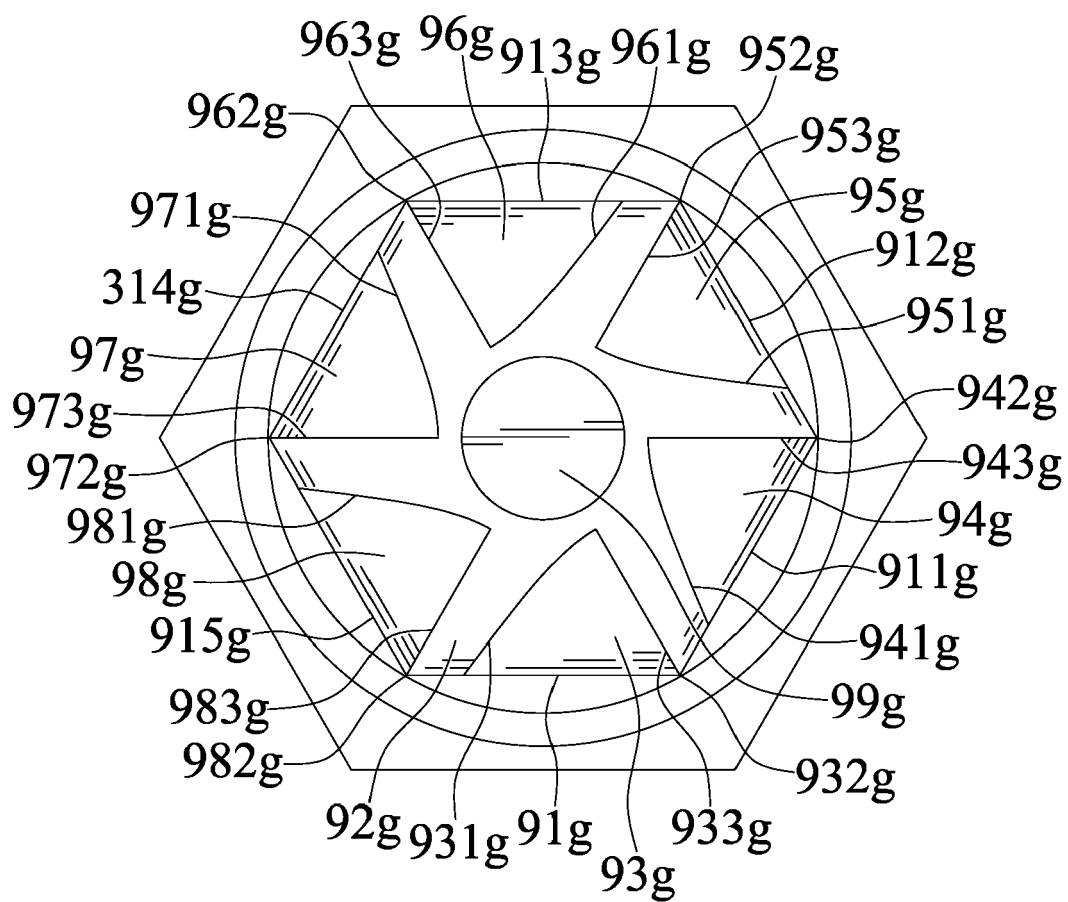


FIG. 12



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Application Number

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Y	* abstract; figures 1, 2, 3, 6, 7-21 *	12-14	

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Y	* paragraphs [0044] - [0061]; figures	12-14	
A	1-8, 12, 16, 18 *	2-11	

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A	* paragraphs [0013] - [0027]; figures 1-4 *	2-15	

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A	* paragraphs [0028] - [0035]; figures 1, 2, 4, 5, 8, 9, 11, 12 *	2-15	

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A	* column 1, line 65 - column 3, line 12; figures 1, 3, 4 *	2-15	

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 11 March 2022	Examiner Pastramas, Nikolaos
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			

**ANNEX TO THE EUROPEAN SEARCH REPORT
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