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(71) Applicant: **Hong, Jingsong**
Fuyang, Anhui 236000 (CN)

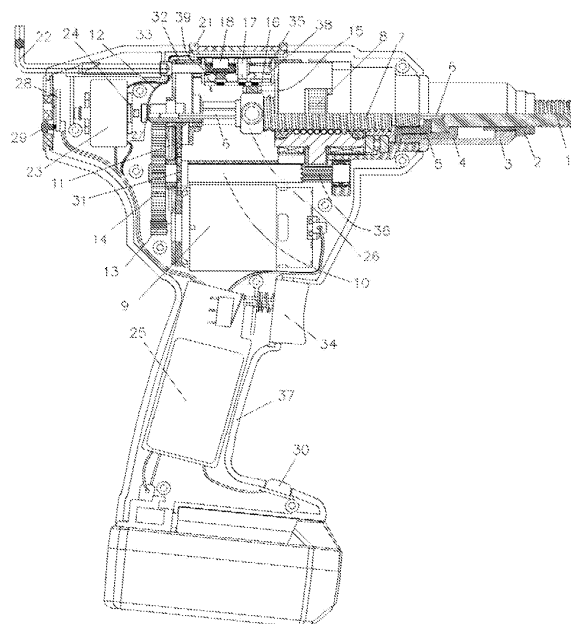
(72) Inventor: **Hong, Jingsong**
Fuyang, Anhui 236000 (CN)

(74) Representative: **Karaahmet, Erdogan**
Yalciner Patent and Consulting Ltd.
Tunus Cad. 85/3-4
Kavaklidere
Cankaya
06680 Ankara (TR)

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(54) **RIVET NUT ELECTRIC TOOL**

(57) A rivet nut electric tool comprises an outer cover (37), a clutch control system, a gear transmission system, a travel control system and a screw-rod nut assembly. The clutch control system, the gear transmission system, the travel control system and the screw-rod nut assembly are arranged in the outer cover (37). The clutch control system is cooperated with the gear transmission system to be on and off and transmit. The travel control system precisely controls the travel. Signals can be provided and the nut is riveted by the moving of a screw-rod (7). The gear clutch assembly drives a hexagonal connecting rod (6) to finish rivet nut screwing-in and screwing-out. Three sensors (39) are connected with a circuit board (25) by control lines. The clutch control system is cooperated with the three sensors (39) to work. A trigger (34) is arranged on the outer cover (37). The rivet nut electric tool with these structures has the advantages of that the power is high and rivet nuts with different specifications can be riveted. The circuit board controls precisely the clutch control system, the gear transmission system and the travel control system to make sure that the rivet nuts are reliably installed in place to be riveted. Furthermore, the travel and the electric quantity are visible, and the operation is convenient.



Description

TECHNICAL FIELD

[0001] The present invention relates to the technical field of machinery, more particularly, to a rivet nut electric tool.

BACKGROUND

[0002] As an installation tool dedicated for rivet nuts, rivet nut tools includes pneumatic rivet nut guns and electric rivet nut guns. The pneumatic rivet nut tool has the advantages of high speed and providing large tension. However, rotating blades of a wind motor for screwing in/out the rivet nut are frequently used or may suddenly get stuck and stop working due to a slightly dusty working environment. In addition, the pneumatic motor has limited torsion due to the limitation to its volume. Although a relatively large riveting tension can be provided, the volume will necessarily increase. It can be said that the mechanism for screwing in/out the rivet nut will never fail, and the mechanism has a large torsion and a small size, and thus is very widely used. However, because of the electric rivet nut gun has some limitations, a great deal of inconvenience is brought to the operator. The electric rivet nut gun uses purely mechanical devices to limitedly control of the clutch. Moreover, it is needed to adjust multiple threaded parts simultaneously to ensure the reliability of riveting, and there is no rule to measure the adjustment.

[0003] As the rivet nut tool is used more and more widely, in order to improve the efficiency and quality of the rivet nut, a US patent document with Publication/Issue No. US05605070A is obtained after a search. In this patent document, the rivet nut tool is improved. However, there are still some shortcomings, and the main defects are reflected in detail as follows.

(1) Since it is hard to control the mechanical clutch travel, the requirement for clutch only can be met when a fixed position is reached. Therefore, there is a large idle travel, resulting in a waste of time and electricity and low production efficiency.

(2) By using the torsion of a mechanical torsional spring to ensure the magnitude of the rotating force, the rotating force of screwing in/out the rivet nut is small. When the rivet nut cannot be screwed out accidentally and the torsional spring is frequently used, the torsional spring can easily overheat due to the repeated friction and impact with other associated mechanical parts such that the torsion of the torsional spring will be unstable with the temperature change, resulting in risk of damage or incomplete rotation during the screwing-in process of the rivet nut.

(3) The normal operation is extremely cumbersome.

It is needed to adjust multiple threaded structural parts simultaneously to ensure the screwing-in length and the riveting length. The requirement for travel adjustment should be met. The requirement of the strength of pull riveting as needs to be met. Due to the requirement of relatively reliable riveting, the thread needs to be tightened (if the thread is not screwed tight, the thread easily loosen such that the travel of the thread is changed and the thread is damaged). Sometimes, the adjusted travel is changed after the thread is screwed tight. It is hard for non-professional, unskilled persons to operate smoothly. When a small number of rivet nuts are used, it takes more time in adjustment than in operation.

(4) The structure is complex. There are a lot of parts that are prone to failure.

(5) Motor power is small. The fastening force generated by the interference fit between the outer diameter of the motor shaft and the aperture diameter of the motor gear is small such that it is easy to slip and loosen. Therefore, tension is limited, meaning that large scale rivet nuts cannot be riveted.

(6) The lifespan is short. Many parts are vulnerable and not easy to replace.

TECHNICAL PROBLEM

[0004] In order to solve the above technical problem, the object of the present invention is to provide a rivet nut electric tool which is powerful and can be reliably riveted with rivet nuts with different specifications. The circuit board precisely controls the clutch control system, the gear transmission system, and the travel control system to ensure that rivet nut is reliably mounted in place. In addition, the rivet nut electric tool has the characteristics of visible travel and battery level, long life span, easy replacement, easy use, and high practicability.

SOLUTION TO PROBLEM

Technical solution

[0005] The scheme of the present invention is as follows. A rivet nut electric tool, characterized in that, the rivet nut electric tool comprises an outer cover, a pull rod, a gun head, an outer sleeve, a pull rod fixing locknut, a screw rod locknut, a hexagonal connecting rod, a gear transmission system, a travel control system, a screw rod nut assembly, and a clutch control system.

[0006] The gear transmission system includes a motor, a motor gear, and a gear assembly, the gear assembly includes a gear I, a gear II, and a connecting shaft, the connecting shaft is provided with the gear I and the gear II in sequence from left to right, an right end of the connecting shaft is machined with hobbing; one end of the

motor is connected, through a control line, to a circuit board fixed in the outer cover, and the other end of the motor is connected with the motor gear; the motor gear engages with the gear I. The motor is a new-type brushless motor. The motor is driven by a battery or AC-DC power supply.

[0007] The travel control system includes an adjusting block guiding shaft, an adjusting block I, an adjusting block II, and a travel plate; the travel plate and the adjusting block guiding shaft are fixed in an adjusting box, the travel plate is located below the adjusting block guiding shaft, the adjusting box is fixed in a gear box; the adjusting block guiding shaft is provided with the adjusting block II and the adjusting block I from left to right; the adjusting block I is provided with an adjusting bolt I, the adjusting block II is provided with an adjusting bolt II, the adjusting bolt I and the adjusting bolt II pass through a positioning rear cover and are fixed on the adjusting box; the travel plate is provided with three sensors from left to right, the sensor in the middle is connected to the adjusting block II.

[0008] The screw rod nut assembly includes a screw rod, a screw rod nut, a wheel positioning block, and a magnet, the wheel positioning block is radially fixed to a left end of the screw rod, the magnet is provided on the wheel positioning block; the screw rod nut is provided on a threaded portion of the screw rod, the screw rod nut is provided with engaging teeth that can engage with the hobbing; the screw rod is sleeved on the hexagonal connecting rod, the screw rod nut is fixed on the gear box. The screw rod drives the magnet on the wheel positioning block to provide signals to make the circuit board intelligently control the electromagnet. The electromagnet controls the clutch control system through magnetic force of magnetic field to make the mechanical mechanism of the travel control system move to achieve the goal of precisely controlling the travel. Compared with the traditional mechanical control system, the present invention has the advantage of simple structure, reliability, and uncomplexity.

[0009] The clutch control system includes a gear clutch assembly, and an electromagnet control device for controlling the connection of the gear clutch assembly and the gear transmission system.

[0010] The screw rod locknut is sleeved on the screw rod nut; the pull rod is connected to the screw rod locknut through the pull rod fixing locknut; the outer sleeve is provided outside the pull rod fixing locknut; the gun head is connected to a right end of the outer sleeve. The pull rod can be replaced according to the specification of the rivet nut. To replace the pull rod, the only thing that needs to be done is detaching the outer sleeve first, and then detaching the pull rod fixing locknut, and then taking the pull rod out. This process is simple and convenient and suitable for riveting rivet nuts with different specifications.

[0011] The three sensors are connected to the circuit board through the control line; the outer cover is provided with a trigger. The sensors are able to sense the move-

ment of the screw rod nut assembly, obtain signals and perform intelligent control through the circuit board.

[0012] The electromagnet control device includes a spring piece fastener, a spring piece, an electromagnet, and an electromagnet push rod, the spring piece fastener is provided at a left end of the gear clutch assembly; the electromagnet fixed in the outer cover is provided with an electromagnetic push rod; A right end of the electromagnet push rod faces towards the spring piece fastener; one end of the spring piece is fixed on the positioning rear cover, the other end of the spring piece is disposed on the spring piece fastener; the hexagonal connecting rod is fixed at a right end of the gear clutch assembly.

[0013] The motor gear is a thickened motor shaft which is machined to have toothed gear(s). The motor gear overcomes the defect that the interference fit between the outer diameter of the motor shaft and the aperture diameter of the motor gear can only generate small fastening force, resulting in looseness after frequent use.

[0014] The outer cover is provided with an emergency button. The emergency button is connected to the circuit board through control lines. If there is an emergency, the emergency button can be pressed and the motor will control the gear transmission system to rotate inversely to screw-out the rivet nut. This is safe and reliable.

[0015] The outer cover is provided with a residual electricity display device located at a rear end of the electromagnet, the residual electricity display device includes a residual electricity display screen and a residual electricity display button, the residual electricity display button is fixed on the residual electricity display screen and connected to the circuit board through the control line. The residual electricity display device can show the amount of residual electricity, has visibility and is more humanized.

[0016] The outer cover located above the adjusting box is provided with a transparent cover, the transparent cover is provided with scales. This process is intuitive, transparent, stable and reliable, and even non-professional operators can easily operate to achieve a good riveting effect.

BENEFICIAL EFFECT OF INVENTION

Beneficial effects

[0017] The present rivet nut electric tool has following advantages and beneficial effects.

(1) A new-type brushless motor is used. This motor is powerful. The motor gear is hard and reliable. The motor gear overcomes the defect that the interference fit between the outer diameter of the motor shaft and the aperture diameter of the motor gear can only generate small fastening force, resulting in looseness after frequent use. This motor is able to reliably rivet large-scale rivet nuts and thus overcomes the defect that the current electric rivet nut tool cannot

rivet large-scale rivet nuts;

(2) Mechanical motion is used to provide signals in combination with the chip in the circuit board to control the electromagnet to produce magnetic force from the magnetic field so as to the control gear clutch such that the nut loading system and riveting system are associated with and independent of each other. Using a magnetic force of a magnetic field to control gear clutch is innovative in the field of riveting. This mechanism has large torsion and precise control. In particular, it solves the problem that the rivet nut cannot be reliably loaded in place.

(3) The screwing-in length and the pull-riveting length of the rivet nut can be adjusted by only adjusting the electronic elements on the circuit board. With the transparent cover, the adjusted travel is visible. This is intuitive and transparent, stable and reliable. In addition, travel scales are provided such that those non-professionals can successfully operate the tool.

(4) The pull-riveting outer sleeve is simple and convenient. There are only two elements. Thus, elegant appearance can be achieved.

(5) An emergency button is provided. In case there is a lack of power, rivet nut damage, and riveting overload, the emergency button can be pressed such that the motor will reverse to screw-out the rivet nut. This is very practical.

(6) The amount of residual electricity can be displayed. This makes the operation more humanized.

(7) The length is short and the size is small. Even if there are riveting dead zone, the riveting can be done successfully.

[0018] This is a humanized, intelligent tool, which is portable, suitable for field use, fast. This tool significantly liberates the workforce and improves work efficiency.

BRIEF DESCRIPTION OF DRAWINGS

Description of drawings

[0019]

Figure 1 is a schematic diagram of internal structure of the rivet nut electric tool according to embodiment 1 of the present invention;

Figure 2 is a schematic diagram of the structure of the tool according to the present invention after a 90° clockwise rotation of the top view;

Figure 3 is a right side schematic diagram of partial structure of the tool according to the present invention;

Figure 4 is a top cross-sectional schematic diagram of the structure of the tool according to the present invention;

Figure 5 is a schematic diagram of partial structure of the tool according to embodiment 1 of the present invention;

Figure 6 is a schematic diagram of internal structure of the rivet nut electric tool according to embodiment 2 of the present invention;

Figure 7 is a schematic diagram of partial structure of the tool according to embodiment 2 of the present invention;

Figure 8 is a schematic diagram of internal structure of the rivet nut electric tool according to embodiment 3 of the present invention;

Figure 9 is a schematic diagram of partial structure of the tool according to embodiment 3 of the present invention;

[0020] In the figures: 1, pull rod; 2, gun head; 3, outer sleeve; 4, pull rod fixing locknut; 5, screw rod locknut; 6, hexagonal connecting rod; 7, screw rod; 8, screw rod nut; 9, motor; 10, connecting shaft; 11, gear clutch assembly; 12, spring piece; 13, motor gear; 14, gear I; 15, magnet; 16, travel plate; 17, adjusting block I; 18, adjusting block II; 19, adjusting bolt I; 20, adjusting bolt II; 21, transparent cover; 22, hex wrench; 23, electromagnet; 24, electromagnet push rod; 25, circuit board; 26, wheel positioning block; 27, spring piece fastener; 28, residual electricity display screen; 29, residual electricity display button; 30, emergency button; 31, gear II; 32, gear box; 33, positioning rear cover; 34, trigger; 35, adjusting block guiding shaft; 36, hobbing; 37, outer cover; 38, adjusting box; 39, sensor; 40, spring collar; 41, reset spring I; 42, reset spring II; 43, hole-slot.

EMBODIMENTS OF THE INVENTION

Embodiment of the present invention

[0021] The invention will now be described in further detail with reference to the accompanying drawings.

Embodiment 1

[0022] As shown in Fig. 1, Fig.4, and Fig.5, the rivet nut electric tool includes outer cover 37, pull rod 1, gun head 2, outer sleeve 3, pull rod fixing locknut 4, screw rod locknut 5, hexagonal connecting rod 6, a gear trans-

mission system, a travel control system, a screw rod nut assembly, and a clutch control system.

[0023] The gear transmission system includes motor 9, motor gear 13, and gear assembly. The gear assembly includes gear I 14, gear II 31, and connecting shaft 10. Gear I 14 and gear II 31 are provided on connecting shaft 10 in sequence from left to right. The right end of connecting shaft 10 is machined with hobbing 36. Alternatively, the right end of connecting shaft 10 is provided with a gear. one end of motor 9 is connected, through control lines, to circuit board 25 fixed in outer cover 37, and the other end of motor 9 is connected to motor gear 13. Motor gear 13 is engaged with gear I 14. Motor 9 is a new-type brushless motor. Motor 9 is driven by a battery or AC-DC power supply.

[0024] The travel control system includes adjusting block guiding shaft 35, adjusting block I 17, adjusting block II 18, and travel plate 16. The travel plate 16 and adjusting block guiding shaft 35 are fixed in adjusting box 38. Travel plate 16 is located below adjusting block guiding shaft 35. Adjusting box 38 is fixed in gear box 32. Adjusting block guiding shaft 35 is provided with adjusting block II 18 and adjusting block I 17 from left to right. Adjusting block guiding shaft 35 is used as a rail. Adjusting block I 17 is provided with adjusting bolt I 19, and adjusting block II 18 is provided with adjusting bolt II 20. Adjusting bolt I 19 and adjusting bolt II 20 pass through positioning rear cover 33 and are fixed on adjusting box 38. Adjusting block I 17 and adjusting block II 18 can be moved by passing hex wrench 22 through hole-slot 43 provided on outer cover 37 to rotate adjusting bolt I 19 and adjusting bolt II 20. Hole-slot 43 is easy for hex wrench 22 to pass through to set travel. The electromagnet control device includes spring piece fastener 27, spring piece 12, electromagnet 23, and electromagnet push rod 24. Spring piece fastener 27 is provided on the left end of the gear clutch assembly. Electromagnet 23 fixed in outer cover 37 is provided with electromagnet push rod 24. The right end of electromagnet push rod 24 faces towards spring piece fastener 27. One end of spring piece 12 is fixed on positioning rear cover 33, and the other end of spring piece 12 is fixed to spring piece fastener 27. Hexagonal connecting rod 6 is fixedly connected to the right end of the gear clutch assembly. When the rivet nut is screwed in, the elastic force of spring piece 12 on the left of gear clutch assembly 11 makes the gear clutch assembly engage with gear II 31. After the rivet nut is screwed in, spring piece 12 make gear clutch assembly 11 self-return under the action of the elastic force. Travel plate 16 is provided with three sensors 39 from left to right. Three sensors 39 correspond to three positions B, C, D, respectively. Sensor 39 in the middle is connected to adjusting block II 18. Initial position D is a fixed position which cannot be adjusted in use and can be adjusted during maintenance. The maintenance terminating position is B, and the transition position is C. Between D and C is a thread-rotational travel adjustment area where the travel distance between D and C can be

adjusted according to the specification of the rivet nut.

[0025] The screw rod nut assembly includes screw rod 7, screw rod nut 8, wheel positioning block 26, and magnet 15. Wheel positioning block 26 is radially fixed on the left end of screw rod 7. Wheel positioning block 26 is provided with magnet 15. The thread portion of screw rod 7 is provided with screw rod nut 8. Screw rod nut 8 is provided with engaging teeth engageable with hobbing 36. Screw rod 7 is sleeved on hexagonal connecting rod 6. Screw rod nut 8 is fixed on gear box 32. Screw rod 7 drives magnet 15 on wheel positioning block 26 to provide signals to make circuit board 25 intelligently control electromagnet 23. Electromagnet 23 controls the clutch control system through magnetic force of magnetic field to make the mechanical mechanism of the travel control system move to achieve the goal of precisely controlling the travel. Compared with the traditional mechanical control system, the present invention has the advantage of simple structure, reliability, and uncomplexity.

[0026] Screw rod locknut 5 is sleeved on the right end of screw rod 7. Pull rod 1 is connected to screw rod locknut 5 through pull rod fixing locknut 4. Outer sleeve 3 is disclosed outside pull rod fixing locknut 4. Gun head 2 is connected to the right end of outer sleeve 3. Pull rod 1 can be replaced according to the specification of the rivet nut. To replace pull rod 1, the only thing that needs to be done is detaching outer sleeve 3 first, and then detaching pull rod fixing locknut 4, and then taking pull rod 1 out. This process is simple and convenient and suitable for riveting rivet nuts with different specifications.

[0027] Three sensors 39 are connected to circuit board 25 via control lines. Outer cover 37 is provided with trigger 34. Sensors 39 are able to sense the movement of the screw rod nut assembly, obtain signals and perform intelligent control through circuit board 25.

[0028] Furthermore, motor gear 13 is a thickened motor shaft machined with gear. Motor gear 13 overcomes the defect that the interference fit between the outer diameter of motor shaft and the aperture diameter of the motor gear can only generate small fastening force, resulting in looseness after frequent use.

[0029] Furthermore, as shown in Fig.1, outer cover 37 is provided with emergency button 30. Emergency button 30 is connected to circuit board 25 through control lines. If there is an emergency, emergency button 30 can be pressed and motor 9 will control the gear transmission system to rotate inversely to screw-out the rivet nut. This is safe and reliable.

[0030] Furthermore, as shown in Fig.1 and Fig.3, outer cover 37 is provided with a residual electricity display device, which is located at the rear end of electromagnet 23. The residual electricity display device includes residual electricity display screen 28 and residual electricity display button 29. Residual electricity display button 29 is fixed on residual electricity display screen 28 and connected to circuit board 25 through control lines. The residual electricity display device can show the amount of residual electricity, has visibility and is more humanized.

[0031] Furthermore, as shown in Fig. 1 and Fig. 2, transparent cover 21 is provided on outer cover 37 above adjusting box 38. Transparent cover 21 is provided with scales. The distance adjusted is visible during travel setting. This process is intuitive, transparent, stable and reliable, and even non-professional operators can easily operate to achieve a good riveting effect.

[0032] Particularly, the gear transmission system, clutch control system, hexagonal connecting rod 6, screw rod nut assembly, travel control system, and pull rod I form a rivet nut automatic screwing in/out the system. Power is turned on and trigger 34 is pressed. After circuit board 25 confirms that gear clutch assembly 11 engages with gear II 31 of the gear assembly, motor 9 provide power to rotate motor gear 13 on motor 9 to rotate gear clutch assembly 11, which makes hexagonal connecting rod 6 and in turn pull rod 1 rotate to screw-in the rivet nut. When the rivet nut is screwed in, signals based on axial movement of screw rod 7 of the screw rod nut assembly will be provided to enable circuit board 25 to intelligently control electromagnet 23. The magnetic force of the magnetic field is used to control and clutch gear clutch assembly 11 such that gear clutch assembly 11 combines with the magnetic field through the mechanical mechanism and circuit board 25 controls reliable axial movement. When reacting with position D, motor 9 can rotate forwardly. When magnet 15 fixed on wheel positioning block 26 moves to adjusted position C, the reaction happens and the motor stops rotation to enable accurate stop and travel. When there is an abnormal situation, button 30 can be pressed to reversely rotate motor 9 to automatically screw-out the rivet nut.

[0033] motor 9, the gear assembly, gear clutch assembly 11, electromagnet 23, the travel control system, pull rod 1, and screw rod nut 8 assembly generating axial movement form a pull-riveting rivet nut system. The axial movement of pull rod 1 pull-rivets rivet nut. When screwing-in of the rivet nut is over and circuit board 25 confirms that magnet 15 reacts with sensor C on travel plate 16, trigger 34 is released and re-pressed. Electromagnet 23 is started under the control of circuit board 25, and gear clutch assembly 11 is separated from gear II 31 on gear assembly. Therefore, the rivet nut automatic screwing-in system completely stops, and motor 9 starts turning the gear assembly to rotate screw rod nut assembly with hobbing 36 engaging with the engaging teeth on screw rod nut 8. Since wheel positioning block 26 on one end of screw rod 7 is radially fixed, only axial movement is available. When magnet 15 senses that sensor 39 on travel plate 16 is at position C, pull-riveting starts. When magnet 15 on screw rod 7 moves to adjusted position B, pull-riveting is finished. Trigger 34 is released, electromagnet 23 is powered off, electromagnet push rod 24 moves backward and leftward, and clutch gear assembly 11 moves leftward under the elastic force of spring piece 12. At the same time, motor 9 soft starts and reverse at a low speed to make gear on the gear clutch assembly engages with gear II 31 reliably and quickly. After the

quick engagement and after the motor confirms the reliable engagement from the circuit board, the motor will instantaneously accelerate and reverse to fast screw-out the rivet nut. At this time, magnet 15 on wheel positioning block 26 that is connected to screw rod 7 returns to position D of sensor 39 on travel plate 16 and intelligently stops again. This means the end of the riveting.

Embodiment 2

[0034] As shown in Fig. 6 and Fig. 7, the electromagnet control device includes reset spring II 42, electromagnet 23, and electromagnet push rod 24. Reset spring II 42 is provided between gear I 14 of the gear assembly and positioning rear cover 33. Electromagnet 23 is provided on the left side of gear I 14, and electromagnet push rod 24 is provided on the right side of electromagnet 23. Gear II 31 of the gear assembly is provided on the right side of the engaging gear of gear clutch assembly 11. Hexagonal connecting rod 6 is fixedly connected to the right end of the shaft of gear clutch assembly 11. After electromagnet 23 is powered on, electromagnet push rod 24 drives the gear assembly to separate gear II from the engaging teeth of gear clutch assembly 11, and hobbing 36 on connecting shaft 10 engages with engaging teeth on screw rod nut 8 to conduct pull riveting. When electromagnet 23 is powered off, reset spring II 42 reset the gear assembly after the effect of the magnetic field of the electromagnet disappears, gear clutch assembly 11 engages with gear II 31, and hobbing 36 on connecting shaft 10 keeps engaging with the engaging teeth on screw rod nut 8. The rivet nut can be screwed in and out. Spring piece 12 and spring piece fastener 27 in embodiment 1 are canceled. Other parts and structure are the same as that in embodiment 1.

Embodiment 3

[0035] As shown in Fig. 8 and Fig. 9, the electromagnet control device includes reset spring I 41, spring collar 40, electromagnetic 23, and electromagnet push rod 24. Electromagnet push rod 24 is provided on the right side of electromagnet 23. The shaft of gear clutch assembly 11 has a hexagonal structure. The right end of the shaft is machined with a connecting hole for connecting with hexagonal connecting rod 6. A groove is provided on the left end of hexagonal connecting rod 6. Spring collar 40 is fixed in the groove. Reset spring I 41 is sleeved on hexagonal connecting rod 6. One end of reset spring I 41 is connected to spring collar 40, the other end of reset spring I 41 is fixed to a stepped hole in screw rod 7. Normally, the machined connecting portion at the front end of the shaft of gear clutch assembly 11 has a hexagonal structure for connecting with the connecting hole machined at the left end of hexagonal connecting rod 6. Similarly, the connecting hole is a hexagonal hole. Under the effect of the electromagnetic field of electromagnet 23, hexagonal connecting rod 6 can connect with the

front connecting portion of the shaft of gear clutch assembly 11 while separating gear clutch assembly 11 from gear II 31, and hobbing 36 on connecting shaft 10 engages with the engaging teeth on screw rod nut 8 to conduct pull riveting. After electromagnet 23 is powered off, hexagonal connecting rod 6 resets under the effect of reset spring I 41 and spring collar 40, while hobbing 36 on connecting shaft 10 keeps engaging with the engaging teeth on screw rod nut 8, and gear clutch assembly 11 engages with gear II 31. The rivet nut can be screwed in and out. Spring piece 12 and spring piece fastener 27 in embodiment 1 are canceled. Other parts and structure are the same as that in embodiment 1.

[0036] Although the detailed description of the specific embodiments of the present invention has been described and illustrated above in detail, it should be noted that various equivalents and modifications of the above-described embodiments may be made in accordance with the concepts of the present invention. The functions of these equivalents and modifications that do not go beyond the spirit of the specification should fall within the scope of the present invention.

Claims

1. A rivet nut electric tool, **characterized in that**, the rivet nut electric tool comprises an outer cover, a pull rod, a gun head, an outer sleeve, a pull rod fixing locknut, a screw rod locknut, a hexagonal connecting rod, a gear transmission system, a travel control system, a screw rod nut assembly, and a clutch control system;
the gear transmission system includes a motor, a motor gear, and a gear assembly, the gear assembly includes a gear I, a gear II, and a connecting shaft, the connecting shaft is provided with the gear I and the gear II in sequence from left to right, a right end of the connecting shaft is machined with hobbing; one end of the motor is connected, through a control line, to a circuit board fixed in the outer cover, and the other end of the motor is connected with the motor gear; the motor gear engages with the gear I; the travel control system includes an adjusting block guiding shaft, an adjusting block I, an adjusting block II, and a travel plate; the travel plate and the adjusting block guiding shaft are fixed in an adjusting box, the travel plate is located below the adjusting block guiding shaft, the adjusting box is fixed in a gear box; the adjusting block guiding shaft is provided with the adjusting block II and the adjusting block I from left to right; the adjusting block I is provided with an adjusting bolt I, the adjusting block II is provided with an adjusting bolt II, the adjusting bolt I and the adjusting bolt II pass through a positioning rear cover and are fixed on the adjusting box; the travel plate is provided with three sensors from left to right, the sensor in the middle is connected to the adjusting block II;

the screw rod nut assembly includes a screw rod, a screw rod nut, a wheel positioning block, and a magnet, the wheel positioning block is radially fixed to a left end of the screw rod, the magnet is provided on the wheel positioning block; the screw rod nut is provided on a threaded portion of the screw rod, the screw rod nut is provided with engaging teeth that can engage with the hobbing; the screw rod is sleeved on the hexagonal connecting rod, the screw rod nut is fixed on the gear box;
the clutch control system includes a gear clutch assembly, and an electromagnet control device for controlling the connection of the gear clutch assembly and the gear transmission system;
the screw rod locknut is sleeved on the screw rod nut; the pull rod is connected to the screw rod locknut through the pull rod fixing locknut; the outer sleeve is provided outside the pull rod fixing locknut; the gun head is connected to a right end of the outer sleeve; the three sensors are connected to the circuit board through the control line; the outer cover is provided with a trigger.

2. The rivet nut electric tool according to claim 1, **characterized in that**, the electromagnet control device includes a spring piece fastener, a spring piece, an electromagnet, and an electromagnet push rod, the spring piece fastener is provided at a left end of the gear clutch assembly; the electromagnet fixed in the outer cover is provided with an electromagnetic push rod; A right end of the electromagnet push rod faces towards the spring piece fastener; one end of the spring piece is fixed on the positioning rear cover, the other end of the spring piece is disposed on the spring piece fastener; the hexagonal connecting rod is fixed at a right end of the gear clutch assembly.
3. The rivet nut electric tool according to claim 1 or 2, **characterized in that**, the motor gear is a thickened motor shaft machined with gear.
4. The rivet nut electric tool according to claim 3, **characterized in that**, the outer cover is provided with an emergency button, the emergency button is connected to the circuit board through the control line.
5. The rivet nut electric tool according to claim 4, **characterized in that**, the outer cover is provided with a residual electricity display device located at a rear end of the electromagnet, the residual electricity display device includes a residual electricity display screen and a residual electricity display button, the residual electricity display button is fixed on the residual electricity display screen and connected to the circuit board through the control line.
6. The rivet nut electric tool according to claim 5, **characterized in that**, the outer cover located above the

adjusting box is provided with a transparent cover,
the transparent cover is provided with scales.

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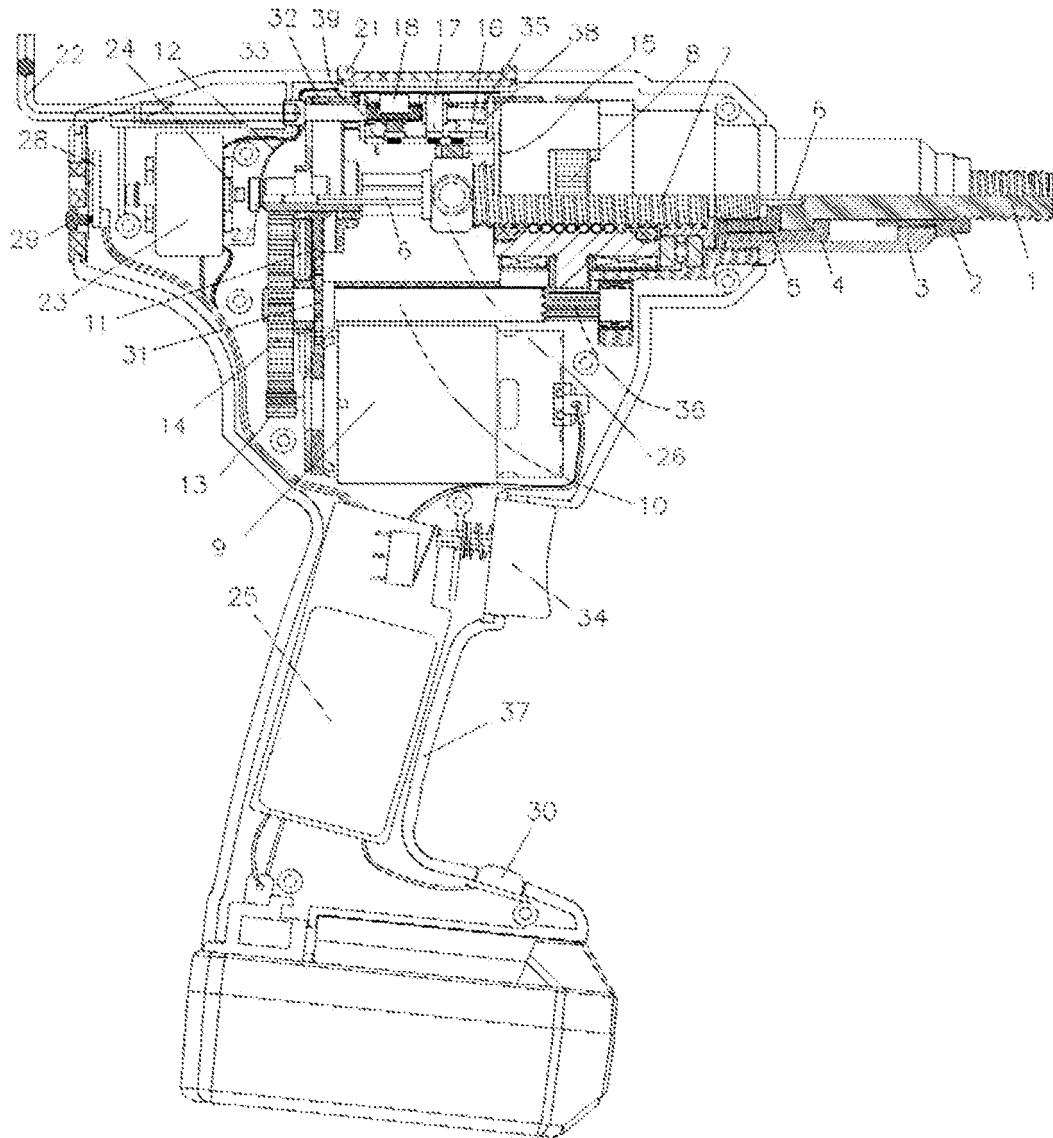
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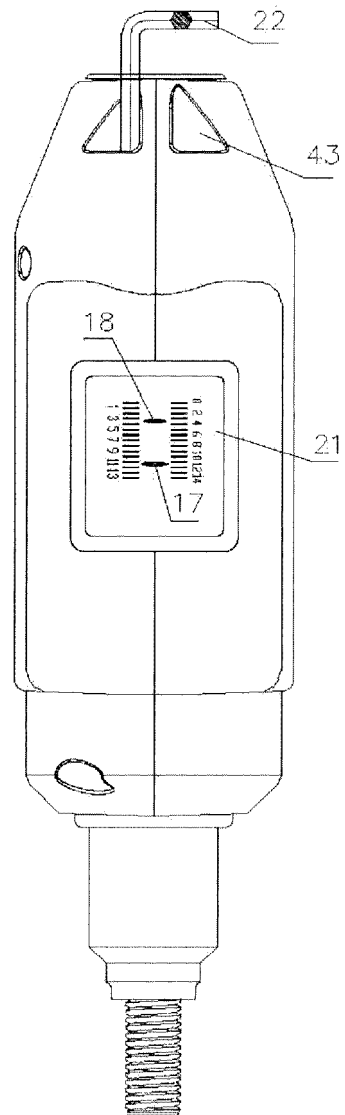
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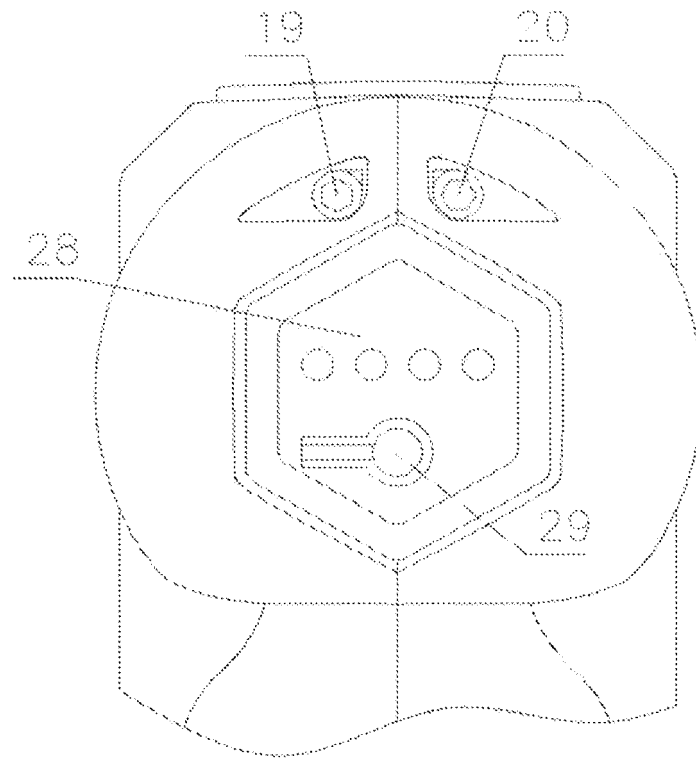
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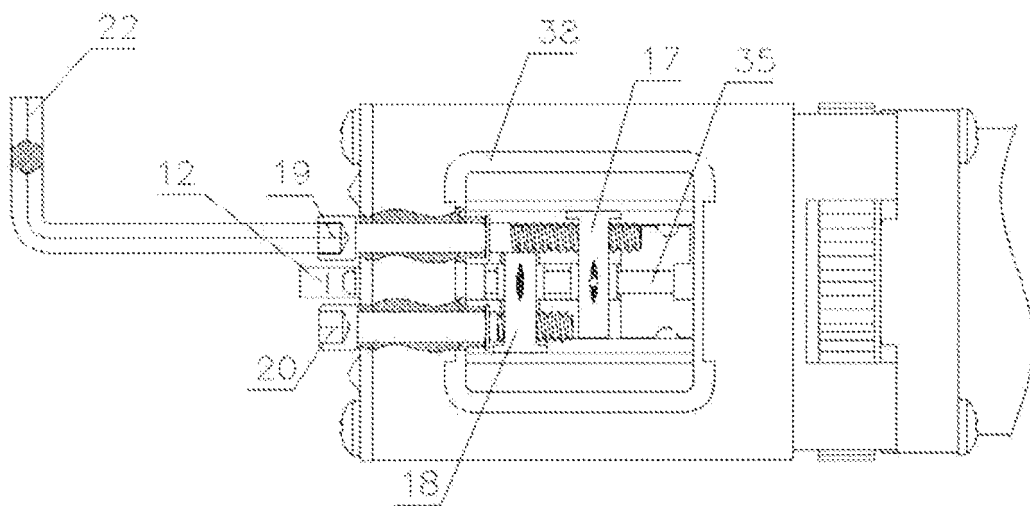
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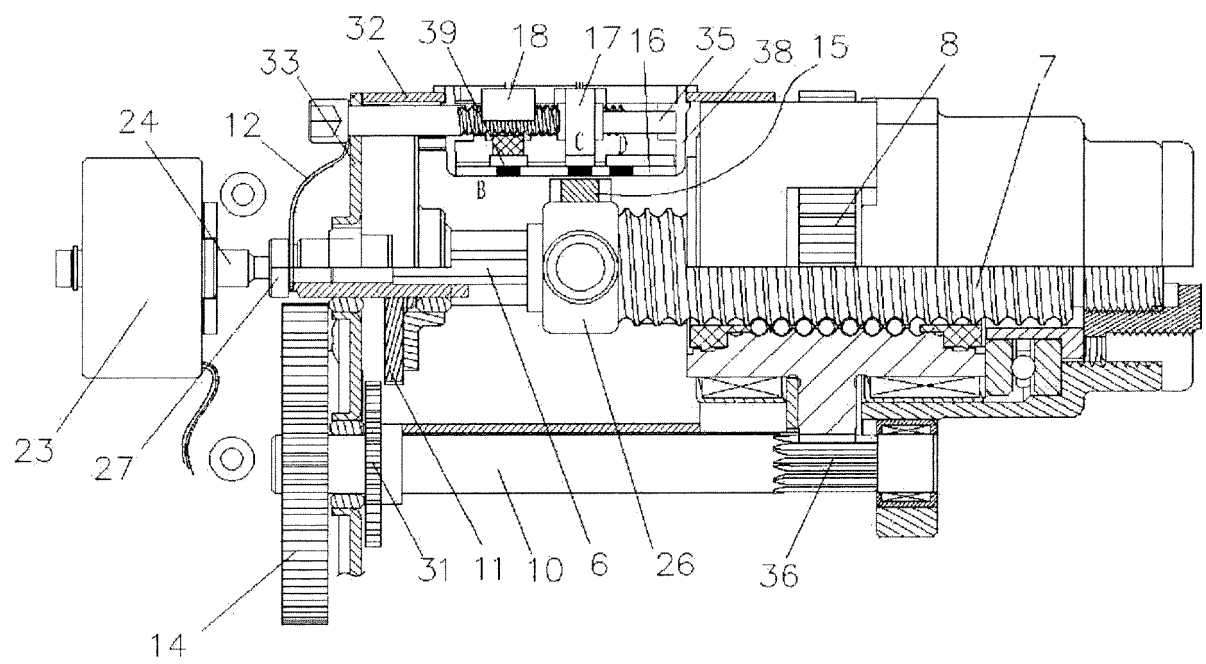




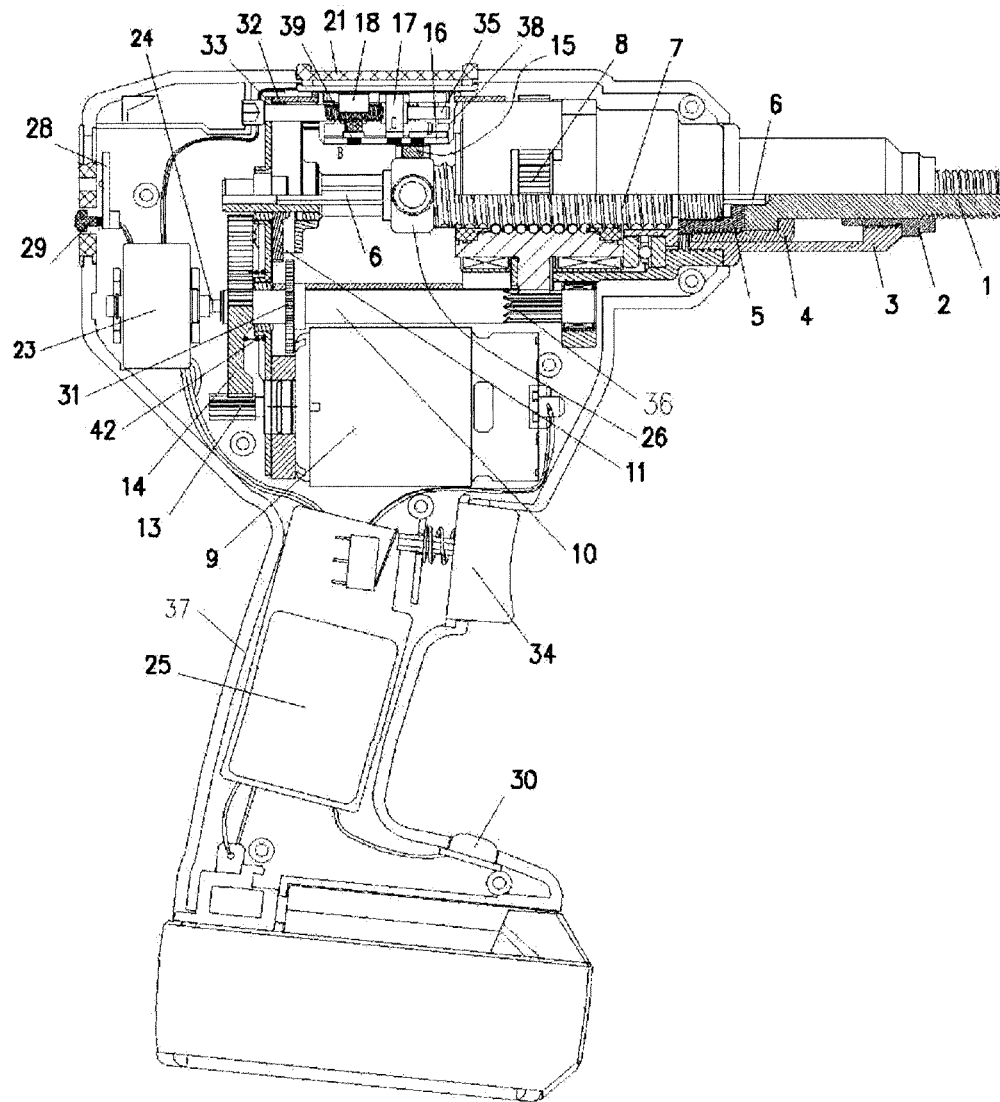
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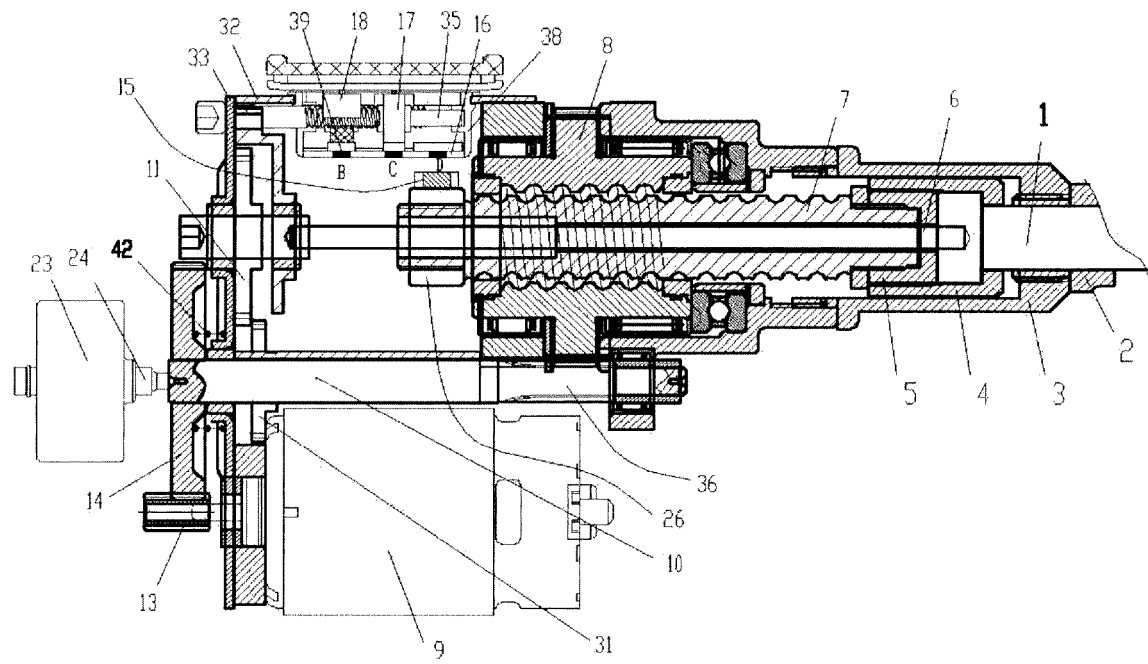


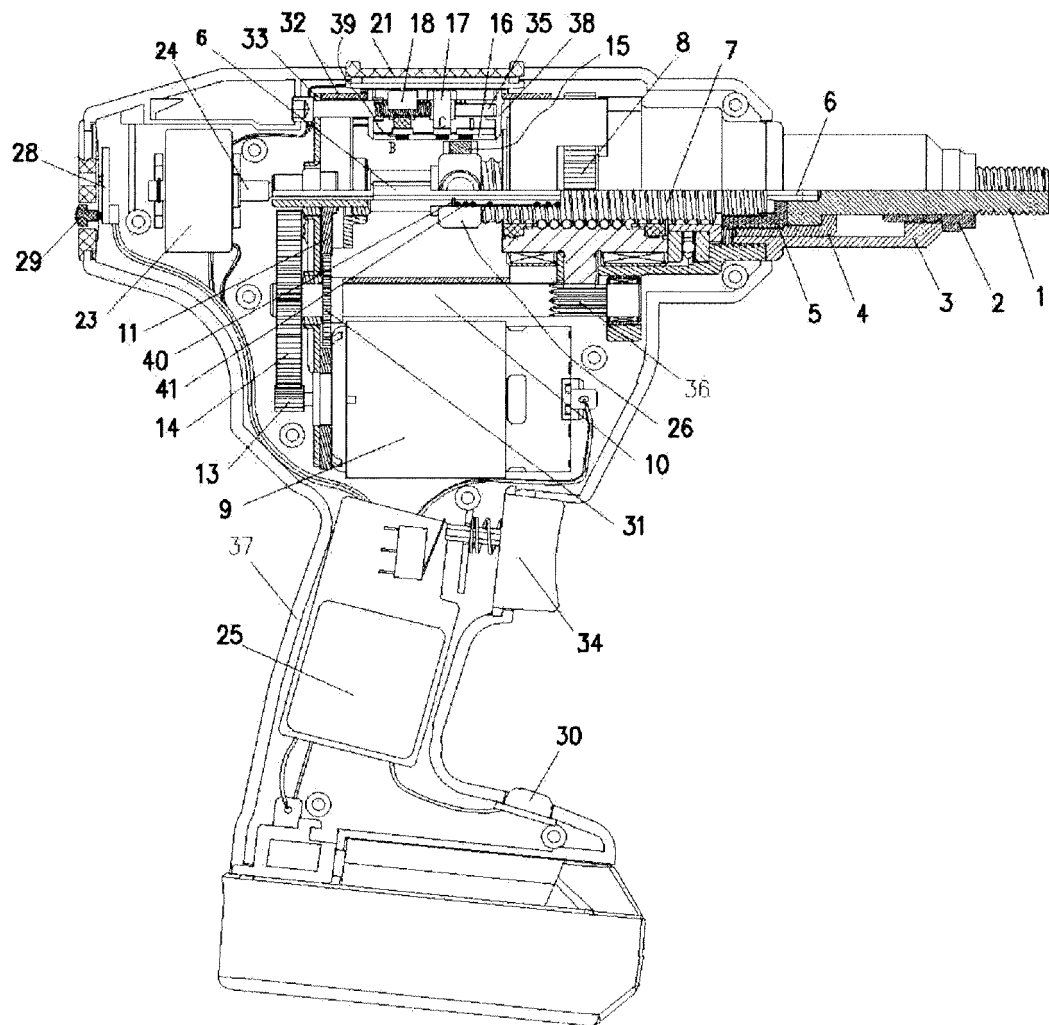
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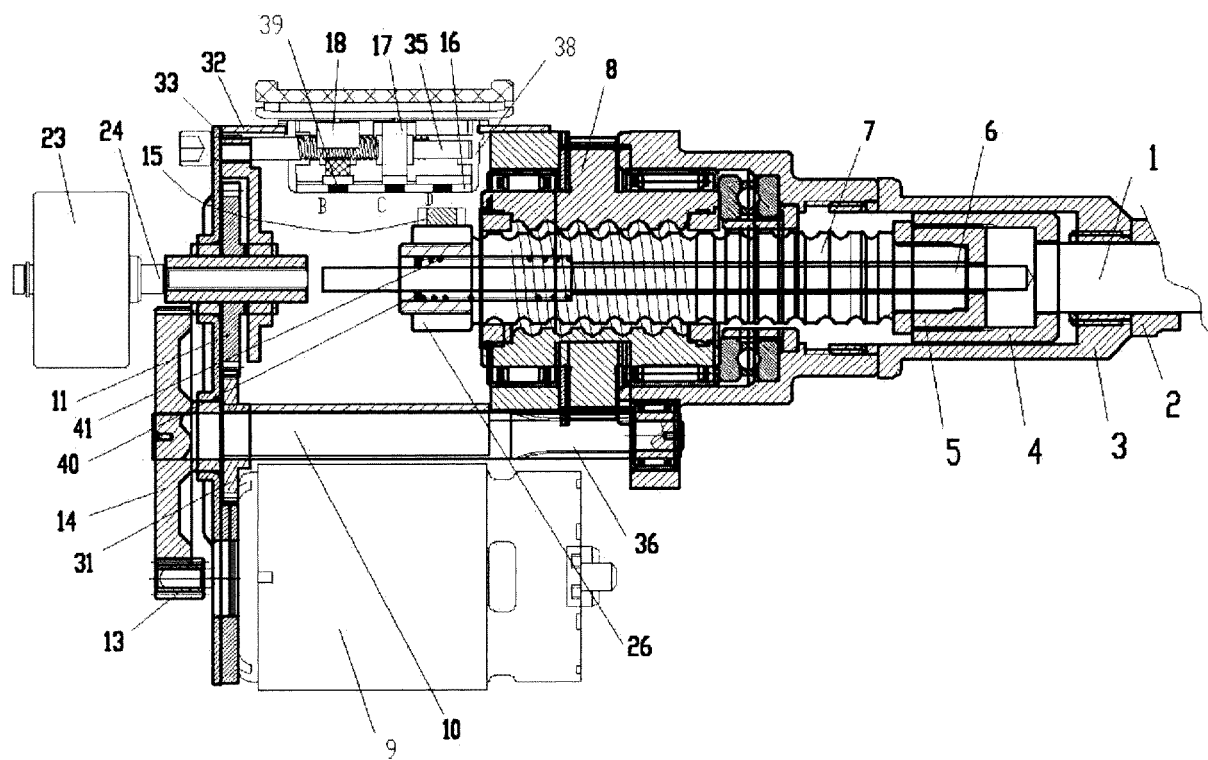


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INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2015/087260

A. CLASSIFICATION OF SUBJECT MATTER

B25B 21/00 (2006.01) i; B25B 23/00 (2006.01) i
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B25B 21/-; B25B 23/-

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

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

CNPAT, CNKI, WPI, EPODOC: rivet nut, screw, nut, electric, driver, gear, clutch, electromagnet, motor

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 204221688 U (HONG, Jinsong), 25 March 2015 (25.03.2015), claims 1-6	1-6
PX	CN 104308790 A (HONG, Jinsong), 28 January 2015 (28.01.2015), claims 1-6	1-6
A	CN 201871671 U (YANGZHOU SHUANGYING TOOL FACTORY), 22 June 2011 (22.06.2011), description, paragraphs [0004]-[0005], and figures 1-2	1-6
A	CN 2822887 Y (WANG, Ronglin), 04 October 2006 (04.10.2006), the whole document	1-6
A	CN 102361729 A (MAKITA CORP.), 22 February 2012 (22.02.2012), the whole document	1-6
A	JP 081536 A (MATSUSHITA ELECTRIC WORKS LTD.), 09 January 1996 (09.01.1996), the whole document	1-6
A	DE 102011018991 A1 (HWA AG.), 31 October 2012 (31.10.2012), the whole document	1-6

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

* Special categories of cited documents:

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“E” earlier application or patent but published on or after the international filing date

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“O” document referring to an oral disclosure, use, exhibition or other means

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

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

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

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

“&” document member of the same patent family

Date of the actual completion of the international search

20 October 2015 (20.10.2015)

Date of mailing of the international search report

12 November 2015 (12.11.2015)

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

Authorized officer

WANG, Rui

Telephone No.: (86-10) 62413861

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2015/087260

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 204221688 U	25 March 2015	None	
CN 104308790 A	28 January 2015	CN 104308790 B	26 August 2015
CN 201871671 U	22 June 2011	None	
CN 2822887 Y	04 October 2006	None	
CN 102361729 A	22 February 2012	US 2012061116 A1	15 March 2012
		RU 2011142756 A	27 April 2013
		CN 102361729 B	06 May 2015
		EP 2412484 A1	01 February 2012
		WO 2010110225 A1	30 September 2010
		US 9038743 B2	26 May 2015
		JP 2010221356 A	07 October 2010
		RU 2529434 C2	27 September 2014
		JP 5537055 B2	02 July 2014
JP 081536 A	09 January 1996	JP 3663638 B2	22 June 2005
DE 102011018991 A1	31 October 2012	None	

Form PCT/ISA/210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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