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(54) **Pneumatic hand tool**

Drucklufthandwerkzeug

Outil manuel pneumatique

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Description

[0001] The present invention relates to a pneumatic hand tool, and more particularly to a pneumatic hand tool according to the preamble portion of claim 1.

[0002] A currently available pneumatic hand tool is shown in Fig. 9, which includes a body (90), a cylinder (91), a rotor (92), a bearing (93), a sealing cap (94) and a control knob (95). The conventional pneumatic hand tool as shown is **characterized in that** the sealing cap (94) is firmly secured to a rear side of the body (90) so as to sealingly encase and position the cylinder (91), the rotor (92) and the bearing (93) inside the body (90). The sealing cap (94) is provided with an inlet passage and a pair of mutually corresponding air conducting passages incorporative with the control knob (95) to control and adjust the air path and air volume entering the cylinder (91). Accordingly, the rotation direction and rotational torque of the pneumatic hand tool is controlled.

[0003] Although this structural arrangement does satisfy the designed goals, the separation of the control knob (95) and the cylinder (91) limits that the body (90) has to be made of a metal material and the airtight capability has to be enhanced so as to accomplish safety requirements. Enhancing safety abilities of this conventional pneumatic hand tool increases the manufacture cost. Also, the metal material limitation for the production of the body (90) results in that the overall weight of the pneumatic hand tool is heavy. As a result of heavy weight of the hand tool, it is not easy for the user to operate the hand tool.

[0004] To overcome the shortcomings, the present invention tends to provide a novel pneumatic hand tool to mitigate the aforementioned problems.

[0005] A pneumatic hand tool comprising the features of the preamble portion of claim 1 is known from US 2003/0136570 A1 and also from US 2003/0230423 A1.

[0006] The primary objective of the present invention is to provide a compact pneumatic hand tool.

[0007] The invention provides a pneumatic hand tool comprising the features of claim 1. Advantageous embodiments are laid down in further claims.

[0008] Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings. In the drawings

Fig. 1 is a perspective view of the pneumatic hand tool of the present invention;

Fig. 2 is an exploded perspective view of the pneumatic hand tool of the present invention;

Fig. 3 is a partially cross sectional view of the pneumatic hand tool of the present invention;

Fig. 4 is a rear side plan view of the pneumatic hand tool of the present invention;

Fig. 5 is side plan view of the cylinder of the present invention;

Fig. 6 is a side plan view of the cylinder in a different angle to that of Fig. 5;

Fig. 7 is a schematic plan view of the cylinder of the present invention;

Fig. 8 is a perspective view of the control knob of the present invention; and

Fig. 9 is an exploded perspective view of a conventional pneumatic hand tool.

[0009] With reference to Figs. 1 to 8, it is noted that the pneumatic hand tool in accordance with the present invention includes a hollow body 10, a cylinder assembly 20 received inside the body 10, a sealing pad 30, a striking assembly 40, a front cap 50 sealingly connected to the body 10 with the sealing pad 30 sandwiched therebetween, a control knob 60 rotatably mounted on a side face of the body 10, an exhaust cap 70 connected to a bottom face of a handle 14 of the body 10 and threaded bolts 80 extended through the body 10 to securely connect the front cap 50 to the body 10.

[0010] The body 10 has a front opening, a space 11 defined in a front portion thereof to communicate with the front opening, a closed rear end provided with a control knob mounting portion 12 and threaded bolt extending portion 13 and a handle 14 extending downward from a bottom face of the body 10 and having a connection portion 140 defined in a bottom face of the handle 14.

[0011] The cylinder assembly 20 is composed of a cylinder 21, a rotor 22, a front cover 23, a first bearing 24, a second bearing 25, a resilient control assembly 26 and a airtight seal 27. The cylinder 21 has a first leakproof portion 21A, a second leakproof portion 21 B, a receiving recess 21C and a rotor receiving chamber 21D. The first leakproof portion 21A and the second leakproof portion 21B respectively have the airtight seal 27. The receiving recess 21C is defined to receive therein the resilient control assembly 26 and the rotor receiving chamber 21D is defined to receive therein the rotor 22. The rotor 22 has a front shaft 220 provided with a first coupling portion 221, a rear shaft 222 extending from a rear side of the rotor 22, multiple slits 223 defined in an outer periphery thereof to respectively receive therein a blade 224. The rear shaft 222 extends through the cylinder 21 to have the second bearing 25 mounted therearound and the front shaft 220 extends through the front cover 23 to have the first bearing 24 mounted therearound with the front cover 23 mounted on the front portion of the cylinder 21. The cylinder 21, which is received in the space 11 of the body 10, has a rear inlet opening 211, a first inlet 212, a second inlet 213, a first exhaust opening 214, a second exhaust opening 215, a first inlet passage 216, a second inlet passage 217, a bottom inlet opening 218 and an inlet 219, wherein the first inlet 212 and the second inlet 213 respectively communicate with the first inlet passage 216 and the second inlet passage 217, the bottom inlet opening 218 communicates with the rear inlet opening 211 via the inlet 219.

[0012] The sealing pad 30 is mounted between the front cap 50 and the body 10 to secure the engagement

between the front cap 50 and the body 10 in an airtight manner.

[0013] The striking assembly 40 has a central axle 41 extending from a first side thereof and a second coupling portion 42 extending a second side thereof opposite to the first side to couple with the first coupling portion 221 of the front shaft 220.

[0014] The front cap 50 has a through hole 51 defined in a front side thereof to allow extension of the central axle 41 therethrough and apertures 52 defined around a face thereof to allow extension of the threaded bolts 80 after extending through the threaded bolt extending portion 13 of the body 10 to secure the engagement between the front cap 50 and the body 10.

[0015] The control knob 60 is mounted at the control knob mounting portion 12 of the body 10 and has a stop recess 61 corresponding to the receiving recess 21C of the cylinder 21 to sandwich the resilient control assembly 26 therebetween, an air inlet 62, a first air exhaust hole 63, a second air exhaust hole 64 and a leak prevention portion 65 with a leak seal 650 such that after the control knob 60 is mounted at the control knob mounting portion 12, the leak seal 650 is able to prevent any leakage between the control knob 60 and the body 10.

[0016] The exhaust cap 70 has a coupling portion 71 corresponding to and engaged with the connection portion 140 of the handle 14.

[0017] After extension of the threaded bolts 80 through the threaded bolt extension portion 13 of the body 10 and into the apertures 52 of the front cap 50, the engagement between the body 10 and the front cap 50 is completed.

[0018] With reference to Figs. 2-8, which are exploded perspective view, sectional view and enlarged perspective views of the components of the present invention, it is noted that the rear end of the central axle 41 of the striking assembly 40 is mounted with the first bearing 24. The outer rim of the first bearing 24 is fitted into the front cover 23. The front shaft 220 of the rotor 22, after extending through the first bearing 24. is connected to the second coupling portion 42 of the striking portion 40 via the first coupling portion 221 thereof, such that rotation of the rotor 22 is able to drive the striking portion 40 to rotate simultaneously. The blades 224 are securely received in the slits 223 of the rotor 22. The front portion of the cylinder assembly 20 is securely connected to the front cover 23 to form a closed space to receive therein the rotor 22 as well as the blades 224. The rear shaft 222 of the rotor 22 is extended through the cylinder 21 to have the second bearing 25 mounted therearound. The control knob 60 is mounted at the rear portion of the cylinder 21 and the central axle 41 of the striking assembly 40 is extended through the through hole 51 of the front cap 50. With the existence of the sealing pad 30 between the boy 10 and the front cap 50, the striking assembly 40 and the cylinder assembly 20 are sealingly sealed between the front cap 50 and the body 10. Also, the connection portion 140 engages with the coupling portion 71 of the exhaust cap 70 to form a light weight and compact pneumatic hand tool.

[0019] It is to be understood, however, that even though numerous chatacteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extant indicated by the appended claims.

Claims

1. A pneumatic hand tool consisting essentially of:

a hollow body (10) having a space (11) in a front portion thereof and a handle (14) extending downward from said space (11) and provided with a connection portion (140) at a bottom face of the handle (14);

a cylinder assembly (20) composed of a cylinder (21), a rotor (22), a front cover (23), a first bearing (24), a second bearing (25), and an airtight seal (27), wherein the cylinder (21) is provided with a first leakproof portion (21A), a second leakproof portion (21B), and a rotor receiving chamber (21D) to receive therein the rotor (22), wherein the rotor (22) has a front shaft (220) extending through the front cover (23) to have the first bearing (24) mounted therearound and provided with a first coupling portion (221) formed on the front shaft (220), a rear shaft (222) oppositely extending relative to the front shaft (220) and through the rear side of the cylinder (21) to have the second bearing (25) mounted therearound, and wherein the front cover (23) is securely connected to the cylinder (21) so as to allow the cylinder assembly (20) to be received in the space (11) of the hollow body (10);

a striking assembly (40) having a central axle (41) extending from a side thereof and a second coupling portion (42) formed oppositely relative to the central axle (41) to correspond to and engage with the first coupling portion (221) of the rotor (22);

a front cap (50) having a through hole (51) defined in a front portion thereof to allow extension of the central axle (41) of the striking assembly (40) and apertures (52) defined around a side face of the front cap (50) such that when the front cap (50) is connected to the hollow body (10), threaded bolts (80) are able to extend through the hollow body (10) and the apertures (52) of the front cap (50) to secure engagement between the hollow body (10) and the front cap (50);

a sealing pad (30) mounted between the hollow

body (10) and the front cap (50) to allow the hollow body (10) to engage with the front cap (50) in a airtight manner;
a control knob (60); and
an exhaust cap (70) with a coupling portion (71) corresponding to and engaged with the connection portion (140) of the handle (14) of the hollow body (10) so that the pneumatic hand tool is compact and lightweight,

characterized in that
the hollow body (10) is formed with a closed rear end and a control knob mounting portion (12) and a threaded bolt extension portion (13) are both defined in said closed rear end of the hollow body (10);
the threaded bolts (80) extend though said threaded bolt extension portion (13) of said closed rear end of said hollow body (10);
the cylinder assembly (20) further comprises a resilient control assembly (26) and the cylinder (21) further comprises a receiving recess (21C) to receive therein the resilient control assembly (26); and
the control knob (60) is mounted at the control knob mounting portion (12) of said closed rear end of said hollow body (10) and has a leak prevention portion (65) with a leak seal (650), the leak seal (650) of the control knob (60) ensures that engagement between the control knob (60) and the body (10) is airtight.

2. The pneumatic hand tool as claimed in claim 1, wherein the cylinder (21) has a rear inlet opening (211), a first inlet (212), a second inlet (213), a first exhaust opening (214), a second exhaust opening (215), a first inlet passage (216), a second inlet passage (217), a bottom inlet opening (218) and an inlet (219), wherein the first inlet (212) and the second inlet (213) respectively communicate with the first inlet passage (216) and the second inlet passage (217), the bottom inlet opening (218) communicates with the rear inlet opening (211) via the inlet (219).

3. The pneumatic hand tool as claimed in claim 1, wherein the control knob has a stop recess (61) corresponding to the receiving recess (21C) of the cylinder (21) to sandwich the resilient control assembly (26) therebetween, an air inlet (62), a first air exhaust hole (63), a second air exhaust hole (64) and a leak prevention portion (56) with a leak seal (650) such that after the control knob (60) is mounted at the control knob mounting portion (12), the leak seal (650) is able to prevent any leakage between the control knob (60) and the body (10).

Patentansprüche

1. Drucklufthandwerkzeug, im Wesentlichen bestehend aus:

einem Hohlkörper (10) mit einem Raum (11) in einem Vorderteil davon und einem Griff (14), der sich vom genannten Raum (11) abwärts erstreckt und an einer Unterseite des Griffes (14) mit einem Verbindungsteil (140) versehen ist,
einer Zylinderanordnung (20), bestehend aus einem Zylinder (21), einem Rotor (22), einer vorderen Abdeckung (23), einem ersten Lager (24), einem zweiten Lager (25) und einer luftdichten Dichtung (27), wobei der Zylinder (21) mit einem ersten leckdichten Teil (21A) versehen ist, einem zweiten leckdichten Teil (21B) und einer Rotorkammer (21D) zur Aufnahme des Rotors (22), wobei der Rotor (22) über einen vorderen Schaft (220) verfügt, der sich durch die vordere Abdeckung (23) erstreckt, derart dass das erste Lager (24) um ihn herum montiert ist, und mit einem ersten Kupplungsteil (221) versehen, der auf dem vorderen Schaft (220) geformt ist, einen hinteren Schaft (222), der sich gegenüber dem vorderen Schaft (220) in der entgegengesetzten Richtung und durch die hintere Seite des Zylinders (21) erstreckt, derart dass das zweite Lager (25) um ihn herum montiert ist, und wobei die vordere Abdeckung (23) am Zylinder (21) fest befestigt ist, derart dass der Zylinderanordnung (20) ermöglicht wird, im Raum (11) des Hohlkörpers (10) aufgenommen zu werden,
einer Schlaganordnung (40), die über eine Mittelachse 41 verfügt, die von einer ihrer Seiten absteht, und einen zweiten Kupplungsteil (42) der relativ zur Mittelachse (41) gegenüber geformt ist, derart dass er mit dem ersten Kupplungsteil (221) des Rotors (22) ausgerichtet ist und mit ihm ineinandergreift,
einer Stirnkappe (50) mit einem durchgehenden Loch (51) in ihrem Vorderteil, um das Ausstrekken der Mittelachse (41) der Schlaganordnung (40) zu erlauben, und Öffnungen (52), die um eine Seitenfläche der Stirnkappe (50) angeordnet sind, so dass bei der Befestigung der Stirnkappe (50) am Hohlkörper (10) Gewindebolzen (80) in der Lage sind, sich durch den Hohlkörper (10) und die Öffnungen (52) der Stirnkappe (50) zu erstrecken, um die Verbindung zwischen dem Hohlkörper (10) und der Stirnkappe (50) zu sichern,
einer Dichtung (30), die zwischen dem Hohlkörper (10) und der Stirnkappe (50) montiert ist, um dem Hohlkörper (10) zu erlauben, mit der Stirnkappe (50) luftdicht ineinanderzugreifen,
einem Betätigungsknopf (60), und
einer Ausstoßkappe (70) mit einem Kupplungsteil (71), das mit einem Verbindungsabschnitt (140) des Griffes (14) des Hohlkörpers (10) korrespondiert und mit diesem in Eingriff steht, so dass das Drucklufthandwerkzeug kompakt und leicht ist,

dadurch gekennzeichnet, dass
der Hohlkörper (10) mit einem geschlossenen Hinterende geformt ist und ein Betätigungsknopfmontageteil (12) und ein Gewindebolzenerstreckungsteil (13) im genannten geschlossenen Hinterende des Hohlkörpers (10) abgegrenzt sind,
sich die Gewindebolzen (80) durch den genannten Gewindebolzenerstreckungsteil (13) im genannten geschlossenen Hinterende des Hohlkörpers (10) erstrecken,
die Zylinderanordnung (20) außerdem eine elastische Betätigungsanordnung (26) umfasst und der Zylinder (21) außerdem eine Aufnahmevertiefung (21C), um die elastische Betätigungsanordnung (26) darin aufzunehmen, und
der Betätigungsknopf (60) am Betätigungsknopfmontageteil (12) des genannten geschlossenen Hinterendes des genannten Hohlkörpers (10) montiert ist und über einen Leckverhütungsteil (65) mit einer Leckdichtung (650) verfügt, wobei die Leckdichtung (650) des Betätigungsknopfes (60) sicherstellt, dass das Ineinandergreifen von Betätigungsknopf (60) und Körper (10) luftdicht ist.

2. Drucklufthandwerkzeug nach Patentanspruch 1, bei dem der Zylinder (21) über eine hintere Einlassöffnung (211) verfügt, einen ersten Einlass (212) einen zweiten Einlass (213), eine erste Ausstoßöffnung (214), eine zweite Ausstoßöffnung (215), einen ersten Einlasskanal (216), einen zweiten Einlasskanal (217), eine Bodeneinlassöffnung (218) und einen Einlass 219), wobei der erste Einlass (212) und der zweite Einlass (213) mit dem ersten Einlasskanal (216) bzw. dem zweiten Einlasskanal (217) verbunden ist, während die Bodeneinlassöffnung (218) über den Einlass (219) mit der hinteren Einlassöffnung (211) verbunden ist.

3. Drucklufthandwerkzeug nach Patentanspruch 1, bei dem der Betätigungsknopf über eine Stopvertiefung (61) verfügt, die der Aufnahmevertiefung (21C) des Zylinders (21) entspricht, um die elastische Betätigungsanordnung (26) dazwischen einzuschließen, einen Lufteinlass (62), ein erstes Luftausstoßloch (63), ein zweites Luftausstoßloch (64) und einen Leckverhütungsteil (56) mit einer Leckdichtung (650), derart dass die Leckdichtung (650) nach der Montage des Betätigungsknopfes (60) im Betätigungsknopfmontageteil (12) in der Lage ist, ein Leck zwischen dem Betätigungsknopf (60) und dem Körper (10) zu verhüten.

Revendications

1. Outil manuel pneumatique composé essentiellement :
d'un corps creux (10) ayant un espace (11) dans une portion antérieure de celui-ci et une poignée (14) qui s'étend vers le bas à partir dudit espace (11) et équipée d'une portion de connexion (140) sur une face de fond de la poignée (14),
d'un dispositif de cylindre (20) composé d'un cylindre (21), d'un rotor (22), d'un couvercle frontal (23), d'un premier palier (24), d'un second palier (25) et d'une garniture étanche à l'air (27), dans lequel le cylindre (21) est équipé d'une première portion étanche contre les fuites (21A), d'une seconde portion étanche contre les fuites (21 B) et d'une chambre qui reçoit le rotor (21D) pour y recevoir le rotor (22), dans lequel le rotor (22) a une tige antérieure (220) qui s'étend à travers le couvercle frontal (23) pour avoir le premier palier (24) monté autour de celle-ci et équipé d'une première portion de couplage (22 1) formée sur la tige antérieure (220), une tige postérieure (222) s'étendant en face par rapport à la tige antérieure (220) et à travers le côté postérieur du cylindre (21) pour avoir le second palier (25) monté autour de celle-ci et dans lequel le couvercle antérieur (23) est relié de manière sûre au cylindre (21) de manière à permettre au dispositif de cylindre (20) d'être reçu dans l'espace (11) du corps creux (10),
un dispositif de choc (40) ayant un axe central (41) qui s'étend d'un côté de celui-ci et une seconde portion de couplage (42) formée en face par rapport à l'axe central (41) pour lui correspondre et pour s'enclencher avec la première portion de couplage (221) du rotor (22),
un capuchon frontal (50) ayant un trou traversant (51) défini dans une portion frontale de celui-ci pour permettre l'extension de l'axe central (41) du dispositif de choc (40) et des ouvertures (52) définies autour d'une face de côté du capuchon frontal (50) de telle manière que, lorsque le capuchon frontal (50) est relié au corps creux (10; des boulons filetés (80) sont capables de s'étendre à travers le corps creux (10) et les ouvertures (52) du capuchon frontal (50) pour fixer l'engrènement entre le corps creux (10) et le capuchon frontal (50),
un rembourrage d'étanchéité (30) monté entre le corps creux (10) et le capuchon frontal (50) pour permettre au corps creux (10) de s'engrener avec le capuchon frontal (50) de manière étanche à l'air,
un bouton de commande (60) et
un capuchon d'échappement (70) avec une portion de couplage (71) correspondant à et qui s'engrène avec la portion de connexion (140) de la poignée (14) du corps creux (10) si bien que l'outil manuel pneumatique est compact et de poids léger,

caractérisé en ce
que le corps creux (10) est formé avec une extrémité postérieure fermée et qu'une portion de montage de bouton de commande (12) et une portion d'extension de boulon fileté (13) sont toutes deux définies dans ladite extrémité postérieure fermée du corps creux (10),
les boulons filetés (80) s'étendent à travers ladite portion d'extension de boulon fileté (13) de ladite extrémité postérieure fermée dudit corps creux (10),
le dispositif de cylindre (20) comprend de plus un dispositif de commande élastique (26) et le cylindre (21) comprend de plus un évidement de réception (21C) pour y recevoir le dispositif de commande élastique (26) et
le bouton de commande (60) est monté sur la portion de montage du bouton de commande (12) de ladite extrémité postérieure fermée dudit corps creux (10) et a une portion de prévention des fuites (65) avec une étanchéité anti-fuite (650), l'étanchéité anti-fuite (650) du bouton de commande (60) assure que l'engrènement entre le bouton de commande (60) et le corps (10) est étanche à l'air.

2. Outil manuel pneumatique selon la revendication 1 dans lequel le cylindre (21) a une ouverture d'arrivée postérieure (211), une première arrivée (212), une seconde arrivée (213), une première ouverture d'échappement (214), une seconde ouverture d'échappement (215), un premier passage d'arrivée (216), un second passage d'arrivée (217), une ouverture d'arrivée par le fond (218) et une arrivée (219), dans lequel la première arrivée (212) et la seconde arrivée (213) communiquent chacune avec le premier passage d'arrivée (216) et le second passage d'arrivée (217), l'ouverture d'arrivée par le fond (218) communique avec l'ouverture d'arrivée postérieure (211) par l'intermédiaire de l'arrivée (219).

3. Outil manuel pneumatique selon la revendication 1 dans lequel le bouton de commande a un évidement d'arrêt (61) qui correspond à l'évidement de réception (21C) du cylindre (21) pour prendre en sandwich le dispositif de commande élastique (26) là entre, une admission d'air (62), un premier trou d'échappement d'air (63), un second trou d'échappement d'air (64) et une portion de prévention des fuites (56) avec une étanchéité anti-fuite (650) de telle manière qu'après que le bouton de commande (60) soit monté sur la portion de montage du bouton de commande (12), l'étanchéité anti-fuite (650) est capable d'empêcher toute fuite entre le bouton de commande (60) et le corps (10).

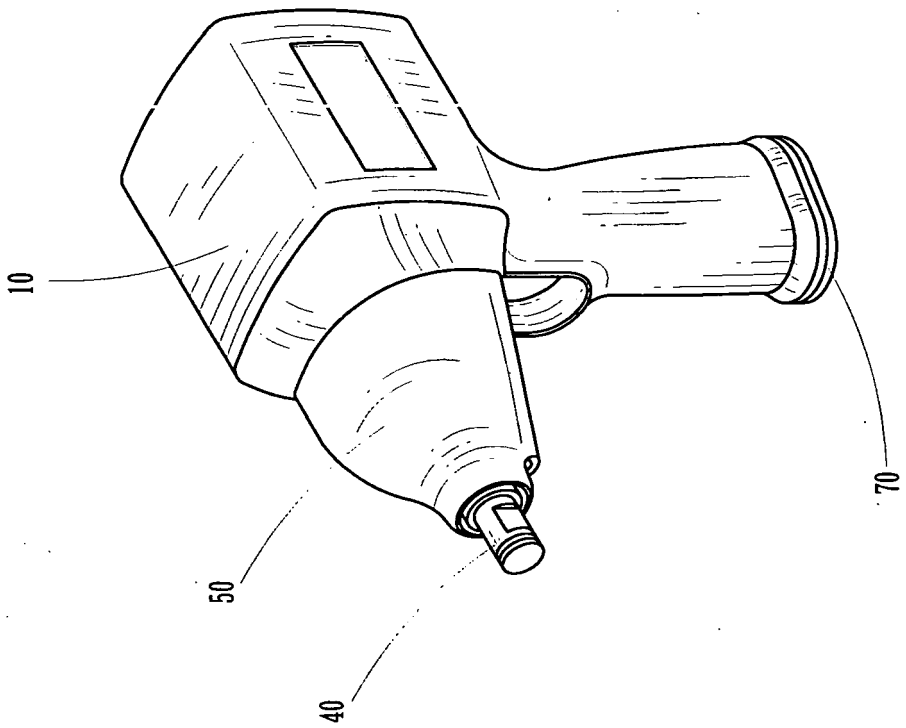


FIG. 1

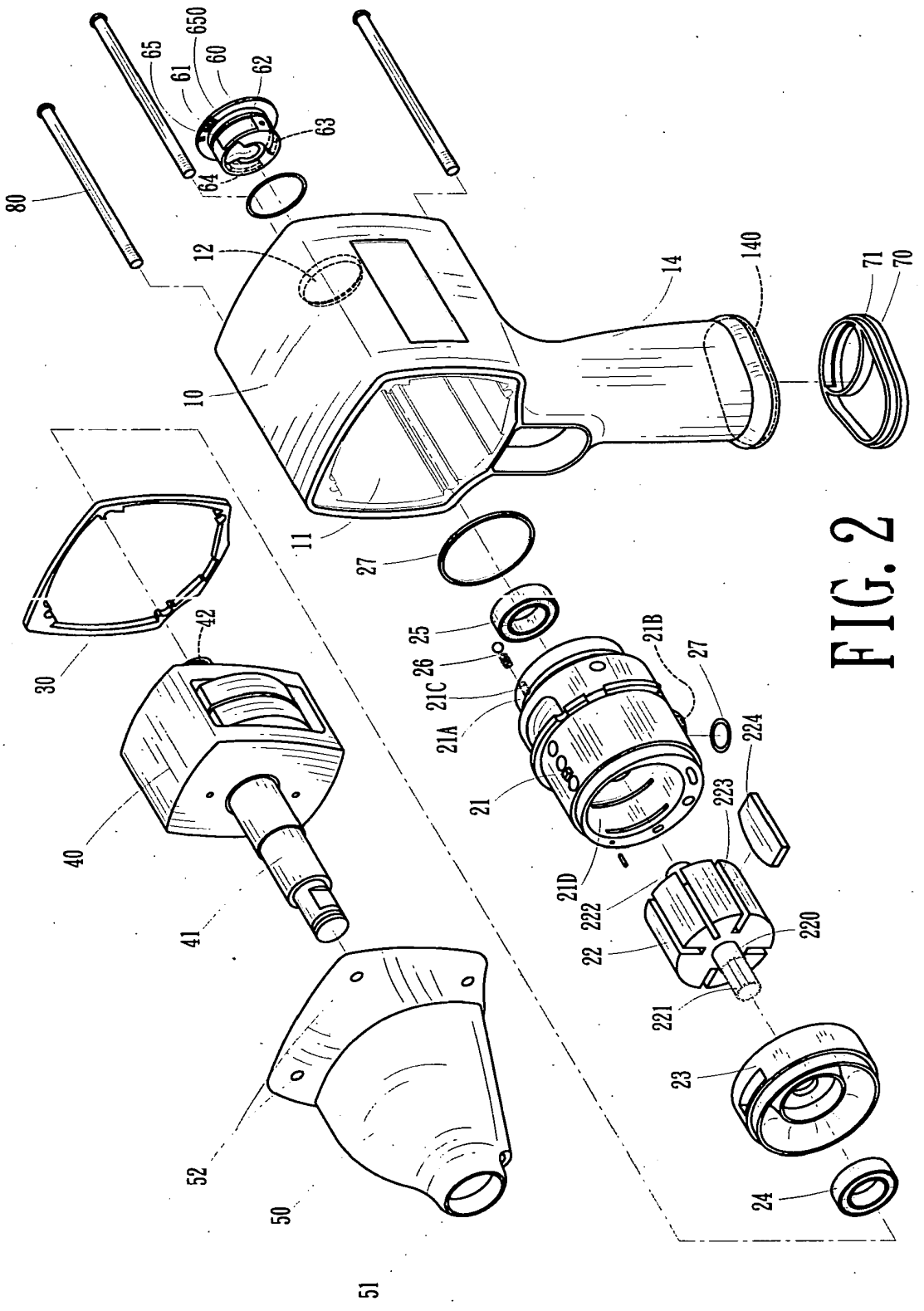
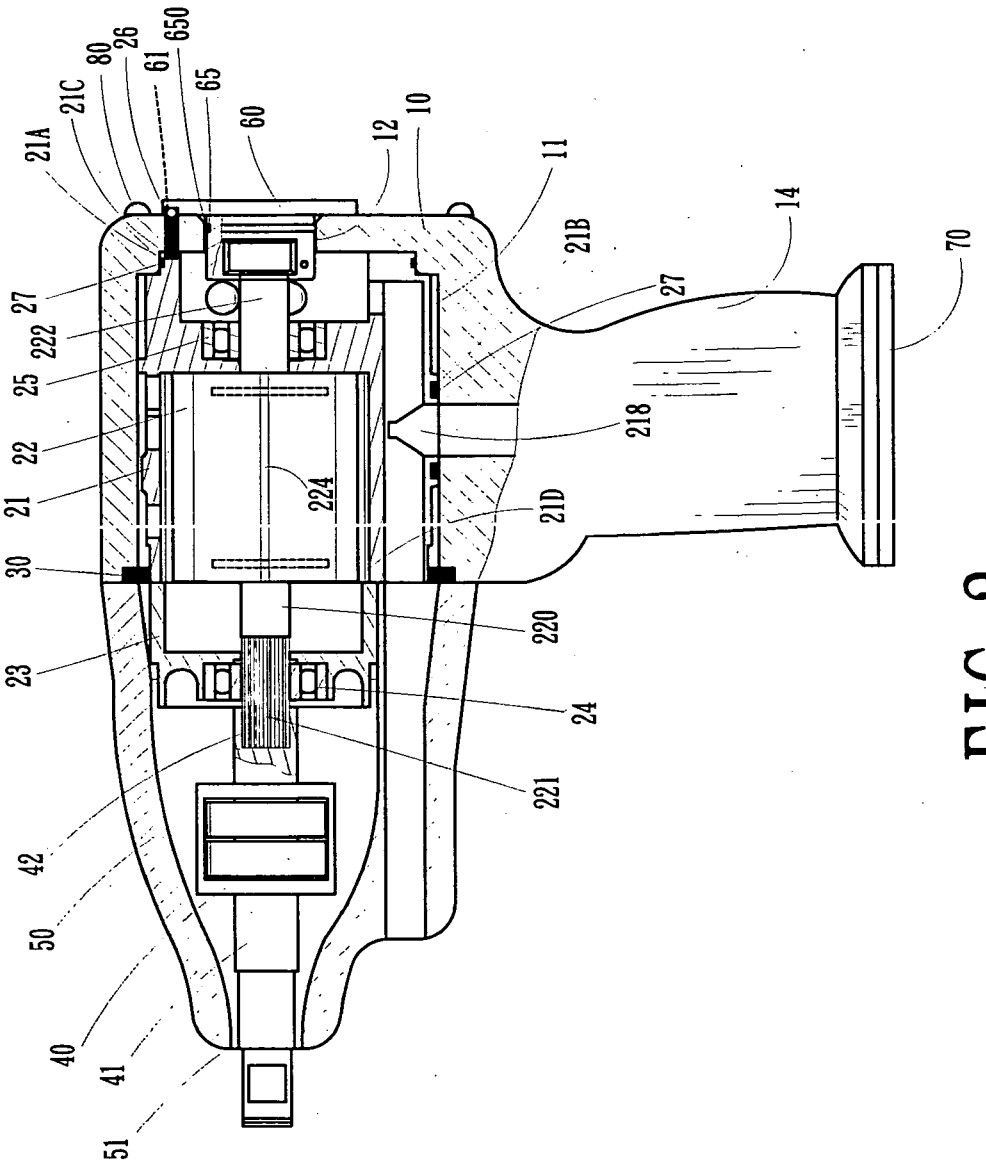

80
65
650
61
60
62
63
64
12
10
11
14
140
71
70
27
25
26
21C
21A
21
21B
27
224
223
222
21D
22
220
221
23
24
30
42
40
41
52
50
51

FIG. 2


650
26
61
80
21C
21A
65
60
12
10
11
21B
14
70
27
27
222
25
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21
30
23
42
50
40
41
51
224
218
21D
220
24
221

FIG. 3

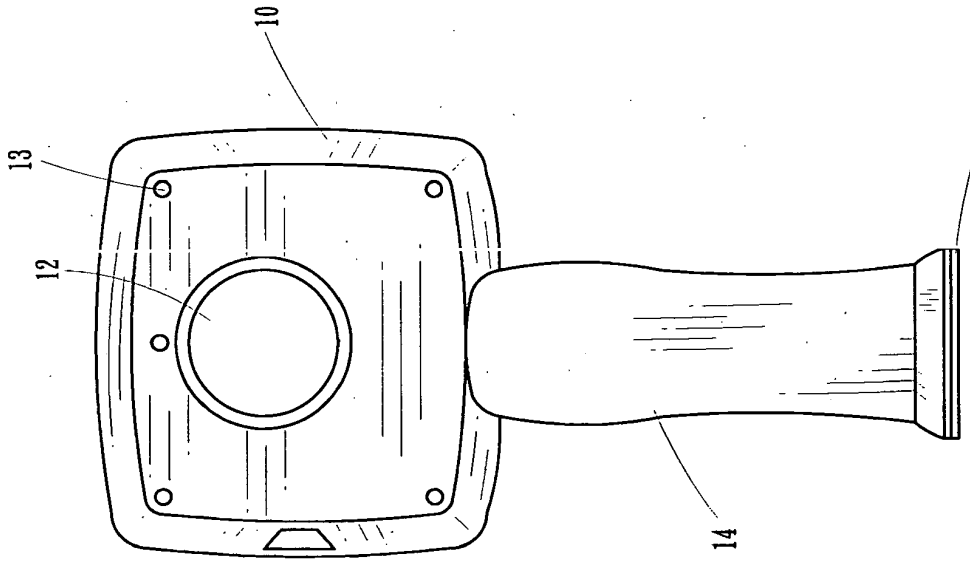


FIG. 4.

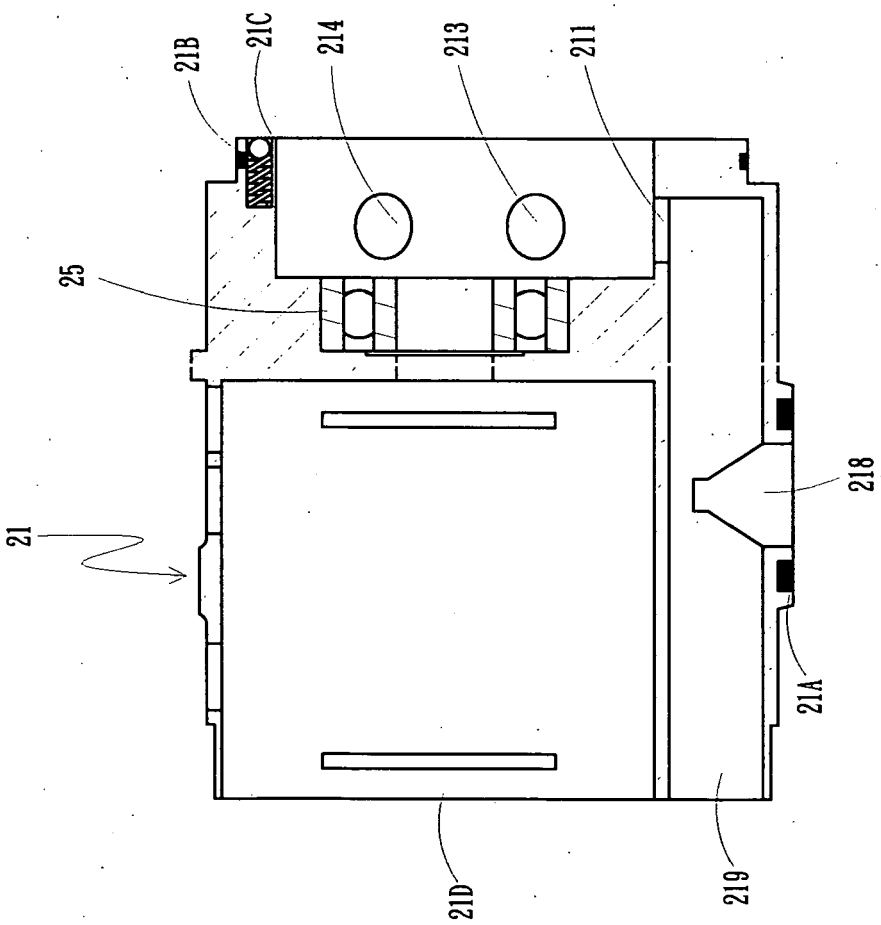


FIG. 5

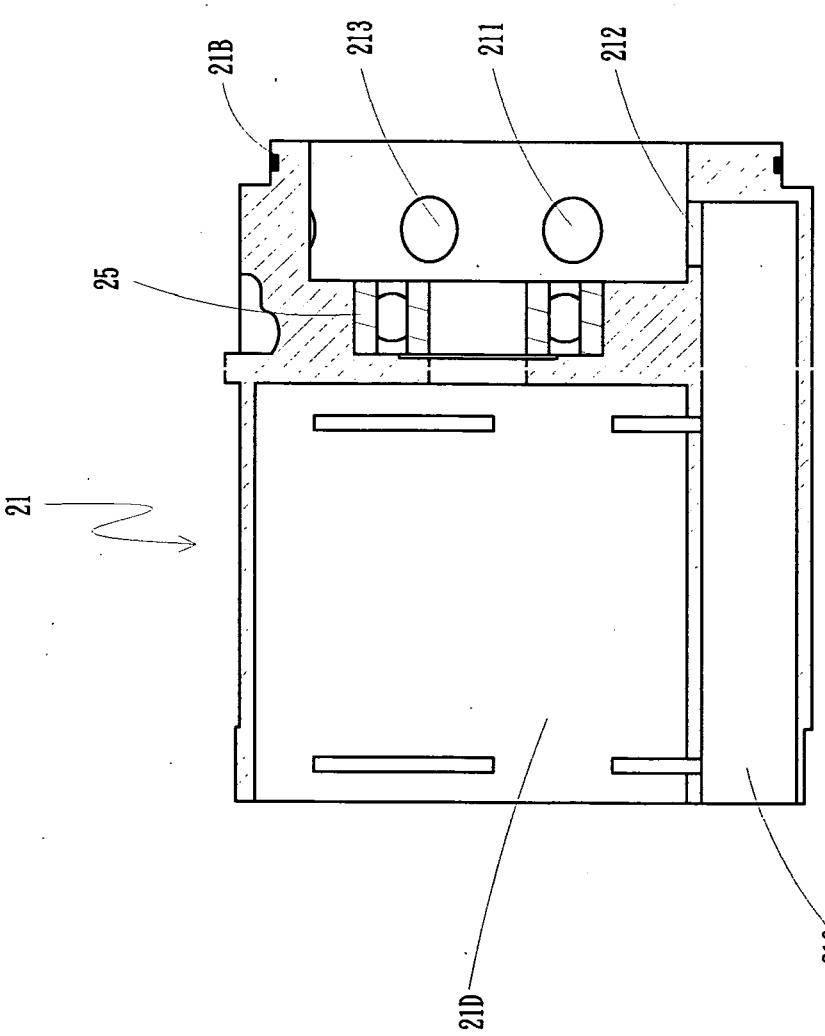


FIG. 6

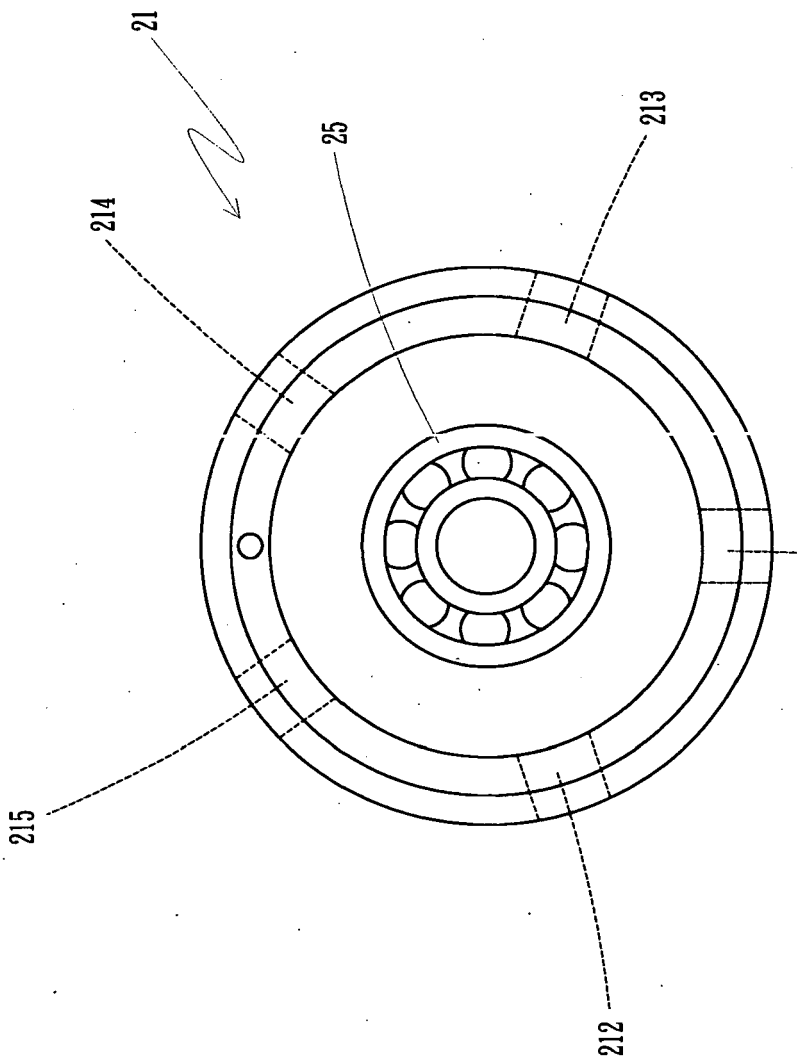


FIG. 7

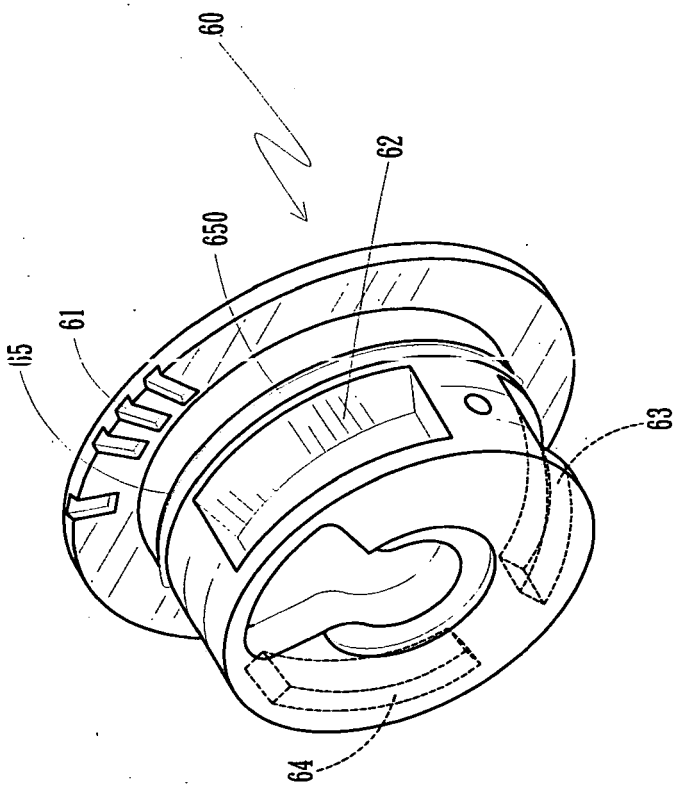
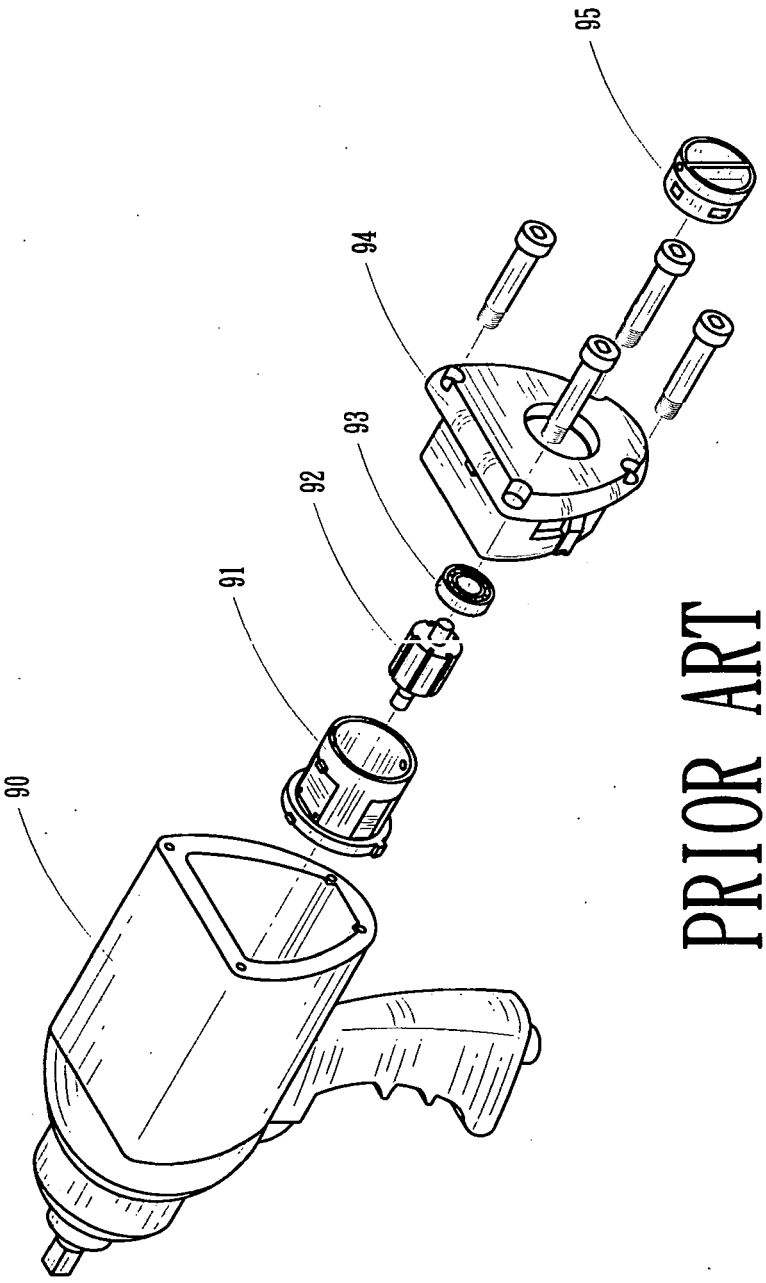


FIG. 8



PRIOR ART
FIG. 9

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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