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# 發明專利說明書

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## 一、發明名稱：（中文/英文）

棘輪扳手

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## 四、聲明事項：

☐ 主張專利法第二十二條第二項☐第一款或☐第二款規定之事實，其事實發生日期為：　年　月　日。

☒ 申請前已向下列國家（地區）申請專利：

【格式請依：受理國家（地區）、申請日、申請案號　順序註記】

☐ 有主張專利法第二十七條第一項國際優先權：

☐ 無主張專利法第二十七條第一項國際優先權：

☐ 主張專利法第二十九條第一項國內優先權：

【格式請依：申請日、申請案號　順序註記】

☐ 主張專利法第三十條生物材料：

☐ 須寄存生物材料者：

國內生物材料 【格式請依：寄存機構、日期、號碼　順序註記】

國外生物材料 【格式請依：寄存國家、機構、日期、號碼　順序註記】

☐ 不須寄存生物材料者：

所屬技術領域中具有通常知識者易於獲得時，不須寄存。

## 九、發明說明：

【發明所屬之技術領域】

本發明係有關一種棘輪扳手，指一種加工容易且確實換向之棘輪扳手，尤其撥鈕利用弧狀擺動操控換向之棘輪扳手。

【先前技術】

常見的換向棘輪扳手如附件一之美國專利號第7146883 號圖二所揭露，其扳手本體(10)具有三個容部(110、111、113)，容部(110、111、113)內分別設有棘輪(20)、卡掣件(30)與頂掣裝置(50)，藉由撥鈕(40)連動換向開關(60)進一步操控卡掣件(30)樞轉嚙合於該棘輪(20)。

附件一這種必須加工三個容部的設計，讓扳手本體的加工成本無法有效的降低，尤其容納頂掣裝置的容部恰與扳手本體同軸，而具有加工上的困難性，除此之外，附件一之單一卡掣件存有換向不確實的隱憂，而有待加以改良。

另外還有一種換向棘輪扳手如附件二之美國專利第6981434 號圖一所揭露，其扳手本體(10)具有三個容部(12、13、14)，惟在容部(13)還設有兩個孔(130、131)，容部(12、14)內分別設有棘輪(20)與兩卡掣件(30)，固定孔(130)供固定件(43)穿伸並結合於撥鈕(40)，撥鈕(40)容置於容部(13)，且容部(13、14)相連通，撥鈕(40)選擇性撥動兩卡掣件(30)，孔(131)容納鋼珠(45)，且撥鈕(40)

選擇性定位於鋼珠(40)。

附件二雖然設有三個容部，但相較於附件一而言，附件二的實施方式確實較為容易加工，且附件二的雙卡掣件之換向效果較附件一確實，然附件二依然存有些許缺失，藉由撥鈕撥動雙卡掣件之凸點，還是存有凸點容易自撥鈕滑脫的缺失，或者撥鈕無法確實連動卡掣件凸點的問題，再者，扳手本體表面因提供撥鈕存置，且撥鈕下方還需設有鋼珠，讓扳手本體頭部的體積無法有效縮小。

除此之外，附件一、二都是利用鋼珠配合彈簧達到頂掣的效果，當使用時日一久彈簧彈性失效，或者在撥動時彈簧產生扭曲都會讓棘輪扳手失去作用，因此如何取代彈簧也是本發明極欲改良之處。

而且鋼珠利用彈簧推動而使得鋼珠反覆的在槽內往覆移動，容易減低使用壽命，而且會導致定位效果不佳的問題，故仍有改進之必要。

再者，鋼珠與彈簧能夠在槽內往覆移動是必須建立在良好的移動路徑上，但是鋼珠在槽內的移動路徑是受到限制的設計，因此鋼珠及槽之間一旦遇到水導致生鏽或是遇到雜質，很容易形成鋼珠移動時的阻礙，相對的就會導致扳手失去定位效果，故仍有改進之必要。

【發明內容】

本發明之棘輪扳手，基於先前技術的種種缺失，申請人希望藉由本發明提出一種僅具有兩個容置空間的本體，

讓本體符合容易加工的期待，且雙卡掣件表面形成有容部，容部提供撥鈕的兩腳部容置，藉由撥鈕的兩腳部選擇性撥動雙卡掣件，達到撥動確實的功效，以及定位件的頂掣無須使用彈簧而改以限位件之彈性定位，確實避免了因彈簧失效而衍生的種種不變。

本發明之棘輪扳手，僅需在本體設兩個容置空間，即可容納棘動件、卡掣裝置與換向開關。兩個容置空間的加工相當容易，完全沒有加工困難的問題，可以有效節省加工成本。再者，本發明藉由撥鈕的兩腳部伸入卡掣件的容部，且撥鈕兩腳部與卡掣件的導引部形成面接觸，藉由撥動撥鈕使兩腳部選擇性拉動兩卡掣件之導引部，因為撥鈕兩腳部確實伸入於容部，兩腳部可以確實的拉動卡掣件，讓卡掣件不會有脫離或滑脫的可能，達到確實拉動卡掣件的目的。

【實施方式】

有關本發明所採用之技術、手段及其功效，茲舉一較佳實施例並配合圖式詳述如後，此僅供說明之用，在專利申請上並不受此種結構之限制。

參照圖一與圖二，為本發明棘輪扳手之立體外觀圖與立體分解圖。本發明之棘輪扳手包含有一本體 10、一棘動件 20、一卡掣裝置 30 與一換向開關 40。

該本體 10 設有一個呈圓形的第一容置空間 11，第一容置空間 11 的內壁面設有一個呈弧形的第二容置空間

12，該第二容置空間 12 連通該第一容置空間 11。該本體 10 具有相對的第一側 13 與第二側 14，該第一容置空間 11 穿透該本體 10 的兩側 13、14，而且第一容置空間 11 靠近第一側 13 突設有一個向內延伸的凸緣 112，該第一容置空間 11 鄰近該第二側 14 設有一環溝 111。

該本體 10 於第一側 13 相對於第二容置空間 12 的位置設有兩個呈弧狀的導孔 15，該兩導孔 15 相通於該第二容置空間 12，該兩導孔 15 以第一容置空間 11 的軸為圓心呈弧狀排列，而且該兩導孔 15 分別包括一弧長 151 與一徑向長度 152。該本體 10 設有一個局部突露於該第二容置空間 12 的定位裝置 16，且該定位裝置 16 位於該二導孔 15 之間。於本實施例中，該定位裝置 16 為一個容槽 161 與一個設於容槽 161 內的定位件 162 所構成。該定位件 162 設於容槽 161 係局部突露於該第二容置空間 12。該定位件 162 係為一鋼珠。這個定位件 162 僅能夠於容槽 161 內轉動而無法於容槽 161 內移動，如此，可以有效避免遇水生鏽或遇雜質而無法移動的問題，克服了先前技術的問題點。

該本體 10 僅需設有該兩容置空間 11、12，且在第二容置空間 12 的上方，也就是本體 10 第一側 13 設該兩導孔 15，兩容置空間 11、12、兩導孔 15 的設計不影響本體 10 的結構強度，讓本體 10 具有高強度的特色，且兩容置空間 11、12 可經由簡易的加工方式輕易完成，除了可以快速加工還可節省加工成本。

該棘動件 20 可轉動的樞設於該第一容置空間 11 內，

且棘動件 20 能夠與該本體 10 產生相對旋轉關係。該棘動件 20 的外緣壁面環設有齒 21，該棘動件 20 內側形成一呈方頭結構之驅動部 22。該棘動件 20 一端環設有一凹環 23，該凹環 23 恰對應於該本體 10 第一容置空間 11 之環溝 111，一 C 型扣 24 扣設於該凹環 23 與該環溝 111，令該棘動件 20 被 C 型扣 24 與凸緣 112 限制而不脫離該本體 10。

該卡掣裝置 30 係可滑動的設於該本體 10 之第二容置空間 12 內，且卡掣裝置 30 能夠與棘動件 20 產生相對的嚙合關係。該卡掣裝置 30 包括兩卡掣件 31 與一個設於兩卡掣件 31 之間的彈性體 32，該彈性體 32 連接該兩卡掣件 31，該兩卡掣件 31 的頂面形成一容部 311 與一導引部 312，該導引部 312 相鄰該容部 311 處為垂直之平面狀，該導引部 312 凸設於該卡掣件 31 的頂面，且相鄰該容部 311，該卡掣件 31 相對於棘動件 20 的一側設有齒 313，以供與棘動件 20 之齒 21 嚙合。卡掣件 31 鄰近齒 313 的一面設有一凹部 314，該彈性體 32 的兩端分別置於該兩卡掣件 31 的凹部 314 內，提供卡掣件 31 嚙合於棘動件 20 之力。

該換向開關 40 設於本體 10 上且能夠於至少兩個位置間移動，在本實施例中，該換向開關 40 具有三個位置，使該換向開關 40 可在三個位置間移動。該換向開關 40 以弧狀擺動的方式設在該本體 10 相對於第二容置空間 12 之位置，用以控制卡掣件 31 與棘動件 20 之間的嚙合關係。

該換向開關 40 包括一撥鈕 41 與一限位件 43。該撥鈕 41 包括一撥動部 411 與兩腳部 412，該撥動部 411 呈弧狀，

使得撥動該撥動部 411 時，該撥動部 411 是沿著導孔 15 呈弧狀移動。該兩腳部 412 由該撥動部 411 之一面突長而出，該兩腳部 412 與該撥動部 411 形成垂直相接，該兩腳部 412 非平行排列而形成一角度，該兩腳部 412 皆指向該第一容置空間 11 與該棘動件 20 的圓心。該腳部 412 的中段處還形成一凹缺 413，該凹缺 413 形成的方向與該撥動部 411 呈平行，且該凹缺 413 朝向該第一容置空間 11。該撥動部 411 平貼於該本體 10 之第一側 13，該兩腳部 412 穿過該本體 10 之兩導孔 15 而伸入第二容置空間 12 內，該兩腳部 412 分別包括一厚度 4121 與一長度 4122，該兩腳部 412 的厚度 4121 小於該兩導孔 15 的弧長 151，該兩腳部 412 可分別在該兩導孔 15 內呈弧狀擺動，該兩腳部 412 的長度 4122 恰等於該導孔 15 的徑向長度 152，該兩腳部 412 之長度 4122 被限制於該徑向長度 152，使該兩腳部 412 不會由該導孔 15 脫出，令該撥鈕 41 設於該導孔 15。該兩腳部 412 穿伸於該兩卡掣件 31 之容部 311 內，以該兩腳部 412 之壁面選擇性拉動該卡掣件 31 之導引部 312。

該限位件 43 具有彈性呈弧形長條片狀，於本實施例係為一鋼片。限位件 43 包括兩長邊與兩短邊，該限位件 43 的兩端分別設有一凹缺 431，該凹缺 431 設在其中之一長邊且位於遠離第一容置空間 11 與棘動件 20 的長邊，兩凹缺 431 之間設有至少兩個限位部 432、434，所述的兩個限位部 432、434 能夠與定位裝置 16 產生相對的定位關係。於本實施例中係設有三個排成一列的限位部 432、433、

434，該限位部 432、433、434 呈圓孔狀而能夠與該定位裝置 16 產生相對之定位關係。該限位件 43 置於該第二容置空間 12 與兩卡掣件 31 之間，該限位件 43 與該撥鈕 41 之兩腳部 412 插接結合，該限位件 43 之凹缺 431 插接於該兩腳部 412 之凹缺 413，該限位件 43 受到該撥鈕 41 操控而呈弧狀移動，該限位件 43 並產生彈性變形選擇性以其中之一限位部 432、433、434 對應於該定位裝置 16 的定位件 162，使該換向開關 40 產生定位效果。由於該定位裝置 16 的定位件 162 不會在容槽 161 內移動，定位件 162 僅能夠轉動，因此可以提高使用壽命，同時具有良好的定位效果。

參照圖三與圖四，為本發明換向開關 40 於第一位置之示意圖。撥動樞擺該換向開關 40 於第一位置，該撥鈕 41 之兩腳部 412 分別在兩導孔 15 內移動，而撥鈕 41 之兩腳部 412 同時帶動該限位件 43 在第二容置空間 12 內移動，該限位件 43 之第二限位部 433 對應於該定位裝置 16，且該定位件 162 定位於該第二限位部 433，進一步固定該撥鈕 41 與該兩卡掣件 31 之相對關係，此時，該兩卡掣件 31 之齒 313 同時嚙合於該棘動件 20 之齒 21，該棘動件 20 將無法相對於本體 10 轉動，也就是說該棘動件 20 會與本體 10 同步轉動，使用時能夠達到微調工作物的效果。

參照圖五與圖六，為本發明棘輪扳手 40 於第二位置之示意圖。撥動樞擺該換向開關 40 撥鈕 41 之撥動部 411 於第二位置，該撥鈕 41 之兩腳部 412 分別在兩導孔 15 內移動，且帶動該限位件 43 在第二容置空間 12 內移動，使該

限位件 43 之第一限位部 432 對應於該定位裝置 16，該定位件 162 定位於該第一限位部 432，進一步固定該撥鈕 41 與該兩卡掣件 31 之相對關係，此時，因為兩腳部 412 皆指向該第一容置空間 11 與該棘動件 20 的圓心，當撥鈕 41 其中之一腳部 412 拉動該其中之一卡掣件 31 之導引部 312 時，將可以使被拉動的卡掣件 31 之齒 313 確實的遠離棘動件 20 之齒 21，且該卡掣件 31 改變與該第二容置空間 12 之相對位置，而另一卡掣件 31 之齒 313 依然嚙合於該棘動件 20 之齒 21，此時該棘動件 20 能夠相對於本體 10 以順時針方向轉動。

值得注意的是，撥鈕 41 的腳部 412 與卡掣件 31 之導引部 312 形成平面的面接觸，撥鈕 41 可以有效並確實的拉動該卡掣件 31，卡掣件 31 不會有脫出或滑脫的可能。

參照圖七與圖八，為本發明棘輪扳手 40 於第三位置之示意圖。撥動樞擺該換向開關 40 撥鈕 41 之撥動部 411 於第三位置，該撥鈕 41 之兩腳部 412 分別在兩導孔 15 內移動，且帶動該限位件 43 在第二容置空間 12 內移動，使該限位件 43 之第三限位部 434 對應於該定位裝置 16，該定位件 162 定位於該第三限位部 434，進一步固定該撥鈕 41 與該兩卡掣件 31 之相對關係，此時，因為兩腳部 412 皆指向該第一容置空間 11 與該棘動件 20 的圓心，當撥鈕 41 其中之一腳部 412 拉動該其中之一卡掣件 31 之導引部 312 時，將可以使被拉動的卡掣件 31 之齒 313 確實的遠離棘動件 20 之齒 21，且該卡掣件 31 改變與該第二容置空間 12

之相對位置，而另一卡掣件 31 之齒 313 依然嚙合於該棘動件 20 之齒 21，此時該棘動件 20 能夠相對於本體 10 以逆時針方向轉動。

該換向開關 40 之限位件 43 具有三個定位的位置，進一步操控撥鈕 41 定位於中間、左邊與右邊的三個位置，利用換向開關 40 於三個位置間的移動，選擇性透過撥鈕 41 操控卡掣件 31 之齒 313 遠離/嚙合該棘動件 20 之齒 21，達到操控棘動件 20 特定方向轉動之目的。

參照圖九，為本發明的第二個實施例。本實施例大致上與前述實施例相同，其差異處有二。第一點差異為驅動件 50 的內側形成一梅花孔結構之驅動部 52。第二點差異是限位件 44 於兩凹缺 441 之間設有第一、第三限位部 442、444，使換向開關 40 能夠於左邊或右邊兩個位置間移動，讓驅動件 50 能夠選擇性的相對於本體 10 產生順時針方向或逆時針方向轉動。上述的結構變化仍然可以產生相同於前述第一個實施例的功效，由此可知，前述的結構等效變化仍屬本發明所欲保護的範疇。

參照圖十與圖十一，為本發明的第三個實施例。本實施例大致上相同於第一個實施例，其差別在於該本體 10 的定位裝置 17 之設計不同。

該本體 10 設有一個局部突露於該第二容置空間 12 的定位裝置 17，且該定位裝置 17 位於該二導孔 15 之間。於本實施例中，該定位裝置 17 為一個自本體 10 第一側 13 衝製的凹槽 171 所形成的一個定位凸塊 172。該定位凸塊

172係局部突露於該第二容置空間12。由於該定位裝置17的定位凸塊172不會移動，故可以有效的提供良好的定位效果，同時更達到了提高使用壽命的效果，而且這樣的設計亦不會發生遇水生鏽或遇雜質而無法移動的問題。由此可知，相同於本發明的等效變化皆屬於本發明所欲保護的範疇。

本發明之棘輪扳手，僅需在本體設兩個容置空間，即可容納棘動件、卡掣裝置與換向開關。兩個容置空間的加工相當容易，完全沒有加工困難的問題，可以有效節省加工成本。再者，本發明藉由撥鈕的兩腳部伸入卡掣件的容部，且撥鈕兩腳部與卡掣件的導引部形成面接觸，藉由撥動撥鈕使兩腳部選擇性拉動兩卡掣件之導引部，因為撥鈕兩腳部確實伸入於容部，兩腳部可以確實的拉動卡掣件，讓卡掣件不會有脫離或滑脫的可能，達到確實拉動卡掣件的目的，以及定位件的頂掣無須使用彈簧而改以限位件之彈性定位，確實避免了因彈簧失效而衍生的種種不便。

就以上所述可以歸納出本發明具有以下之優點：

1.本發明『棘輪扳手』，其僅需設兩個容置空間，確實簡化加工程序，而可節省加工成本。

2.本發明『棘輪扳手』，其中撥鈕的兩腳部伸入卡掣件的容部，且撥鈕兩腳部與卡掣件的導引部形成面接觸，使撥鈕確實拉動卡掣件，讓卡掣件不會有脫離或滑脫的可能，達到確實拉動卡掣件的目的。

3.本發明『棘輪扳手』，其中本體的定位裝置與換向開

關的限位件之間可以達到良好的定位效果，同時提高使用壽命。

惟上所述者，僅為本發明之較佳實施例而已，當不能以之限定本發明實施之範圍，故舉凡數值之變更或等效元件之置換，或依本發明申請專利範圍所作之均等變化與修飾，皆應仍屬本發明專利涵蓋之範疇。

【圖式簡單說明】

圖一：為本發明棘輪扳手之立體外觀圖。

圖二：為本發明棘輪扳手之立體分解圖。

圖三：為本發明棘輪扳手沿圖一 3-3 線所取之剖面圖，表示換向開關位於中間位置。

圖四：為本發明棘輪扳手沿圖三 4-4 線所取之剖面圖，表示換向開關位於中間位置。

圖五：為本發明棘輪扳手圖三之延續，表示換向開關位於右邊位置。

圖六：為本發明棘輪扳手圖四之延續，表示換向開關位於右邊位置。

圖七：為本發明棘輪扳手圖三之延續，表示換向開關位於左邊位置。

圖八：為本發明棘輪扳手圖四之延續，表示換向開關位於左邊位置。

圖九：為本發明棘輪扳手的第二個實施例。

圖十：為本發明棘輪扳手的第三個實施例。

圖十一：為本發明棘輪扳手的第三個實施例。

附件一：美國專利號第 7146883 號專利案。

附件二：美國專利號第 6981434 號專利案。

【主要元件符號說明】

| | | | |
|---|---|---|---|
| 10 | 本體 | 11 | 第一容置空間 |
| 111 | 環溝 | 112 | 凸緣 |
| 12 | 第二容置空間 | 13 | 第一側 |
| 14 | 第二側 | 15 | 導孔 |
| 151 | 弧長 | 152 | 徑向長度 |
| 16 | 定位裝置 | 161 | 容槽 |
| 162 | 定位件 | | |
| 17 | 定位裝置 | 171 | 凹槽 |
| 172 | 定位凸塊 | | |
| 20 | 棘動件 | 21 | 齒 |
| 22 | 驅動部 | 23 | 凹環 |
| 24 | C 型扣 | | |
| 30 | 卡掣裝置 | 31 | 卡掣件 |
| 311 | 容部 | 312 | 導引部 |
| 313 | 齒 | 314 | 凹部 |
| 32 | 彈性體 | | |
| 40 | 換向開關 | 41 | 撥鈕 |
| 411 | 撥動部 | 412 | 腳部 |
| 4121 | 厚度 | 4122 | 長度 |

| | | | |
|---|---|---|---|
| 413 | 凹缺 | 42 | 定位件 |
| 43 | 限位件 | 431 | 凹缺 |
| 432 | 第一限位部 | 433 | 第二限位部 |
| 434 | 第三限位部 | | |
| 44 | 限位件 | 441 | 凹缺 |
| 442 | 第一限位部 | 444 | 第三限位部 |
| 50 | 棘動件 | 51 | 齒 |
| 52 | 驅動部 | 53 | 凹環 |
| 54 | C型扣 | | |

## 五、中文發明摘要：

本發明『棘輪扳手』，包含有一本體，設有兩容置空間，分別容置一棘動件、一卡掣裝置與一換向開關，該卡掣裝置包括兩卡掣件與一彈性體，該兩卡掣件選擇性嚙合於該棘動件，該彈性體連接該兩卡掣件，該兩卡掣件的表面分別形成一容部，該換向開關包括一撥鈕，該撥鈕包括一撥動部與兩腳部，該兩腳部伸入該第二容置空間並位於該兩卡掣件之容部，撥動該撥動部使該兩腳部選擇性拉動該卡掣件，並使該卡掣件之齒選擇性遠離該棘動件之齒。

藉由雙容置空間達到節省加工成本之目的，且利用撥鈕之兩腳部確實的拉動卡掣件，讓卡掣件不會有脫離或滑脫的可能。

## 六、英文發明摘要：

## 十、申請專利範圍：

1.一種棘輪扳手，其包含有：

一本體，設有一個第一容置空間與一個第二容置空間，該第二容置空間連通該第一容置空間，該本體設有一個局部突露於該第二容置空間的定位裝置；

一棘動件，其係樞設於該本體之第一容置空間，該棘動件係用以驅轉工作物，該棘動件之外緣環設有齒；

兩卡掣件，係可滑動的設於該本體之第二容置空間，所述的兩個卡掣件相對於棘動件的一側分別設有齒，所述的兩個卡掣件之間設有一彈性體，所述的兩個卡掣件於頂面分別設有一導引部；

一換向開關，設於該本體上且能夠於至少兩個位置間移動，該換向開關包括有一個撥鈕與一個限位件，該撥鈕具有一個供使用者操作的撥動部與兩個伸入第二容置空間內的腳部，所述的兩個腳部能夠接觸於該兩卡掣件之導引部，該限位件設於第二容置空間內且結合於該撥鈕的兩個腳部，該限位件具有至少兩個限位部，該限位部能夠與該定位裝置產生相對的定位關係。

2.如申請專利範圍第 1 項所述之棘輪扳手，其中該定位裝置包括一個設於本體上的容槽與一個設於容槽內的定位件，該定位件局部突露於該第二容置空間。

3.如申請專利範圍第 2 項所述之棘輪扳手，其中該定位件為一個能夠於容槽內轉動而不移動之鋼珠，該限位件為一具彈性之鋼片。

4.如申請專利範圍第1項所述之棘輪扳手，其中該定位裝置為一個於本體衝製的凹槽所形成的一個定位凸塊，該定位凸塊局部突露於該第二容置空間。

5.如申請專利範圍第1、2或4項所述之棘輪扳手，其中該限位件設有三個限位部，所述的三個限位部定義為第一限位部、第二限位部與第三限位部，使該換向開關能夠於三個位置間移動，該換向開關於第一位置時，該定位機構定位於該第二限位部，固定該撥鈕與該兩卡掣件之相對關係，該兩卡掣件之齒同時嚙合於該棘動件之齒，該棘動件無法相對於本體轉動；該換向開關於第二位置時，該定位機構定位於該第一限位部，該撥鈕之腳部拉動所述兩個卡掣件中之一，使卡掣件之齒遠離該棘動件之齒，該棘動件能夠相對於本體產生順時針方向轉動；該換向開關於第三位置時，該定位機構定位於該第三限位部，該撥鈕之腳部拉動所述兩個卡掣件中之一，使卡掣件之齒遠離該棘動件之齒，該棘動能夠相對於本體產生逆時針方向轉動。

6.如申請專利範圍第5項所述之棘輪扳手，其中該限位部係設為圓孔狀。

7.如申請專利範圍第1、2或4項所述之棘輪扳手，其中該本體開設有兩個連通於該第二容置空間的導孔，所述的兩個導孔係各自供該撥鈕的兩個腳穿伸進入第二容置空間，所述的兩個導孔以第一容置空間的軸為圓心呈弧狀排列，使該撥鈕能夠沿著所述的兩個導孔產生弧狀位移。

8.如申請專利範圍第7項所述之棘輪扳手，其中該兩

導孔分別包括一弧長，該兩腳部分別包括一厚度，該兩腳部穿伸於該兩導孔，該兩導孔的弧長大於該兩腳部的厚度。

9.如申請專利範圍第7項所述之棘輪扳手，其中該兩導孔分別包括一徑向長度，該兩腳部分別包括一長度，該兩腳部穿伸於該兩導孔，該兩導孔的徑向長度等於該兩腳部的長度，令該撥鈕設於該導孔。

10.如申請專利範圍第1項所述之棘輪扳手，其中該腳部與該導引部係為平面與平面的面接觸。

11.如申請專利範圍第10項所述之棘輪扳手，其中該腳部與該導引部之間的接觸平面係沿著第一容置空間的半徑指向該第一容置空間的圓心。

12.如申請專利範圍第7項所述之棘輪扳手，其中該撥鈕之兩腳部分別設有一凹缺，該限位件插置於該兩腳部之凹缺。

13.如申請專利範圍第7項所述之棘輪扳手，其中該限位件兩端分別設有一凹缺，該兩凹缺插接結合於該兩腳部。

14.如申請專利範圍第7項所述之棘輪扳手，其中該撥鈕之兩腳部分別設有一凹缺，該限位件兩端也分別設有一凹缺，該凹缺與凹缺插接結合在一起。

15.如申請專利範圍第12或14項所述之棘輪扳手，其中該撥鈕兩腳部之凹缺朝向該第一容置空間與該棘動件。

16.如申請專利範圍第13或14項所述之棘輪扳手，其中該限位件呈弧形長條片狀，包括兩長邊與兩短邊，該限位件的凹缺設在其中之一長邊且該長邊遠離該第一容置空

間與該棘動件。

17. 如申請專利範圍第 1 項所述之棘輪扳手，其中該卡掣件鄰近齒的一面設有一凹部，該彈性體的兩端分別置於該兩卡掣件的凹部內。

十一、圖式：

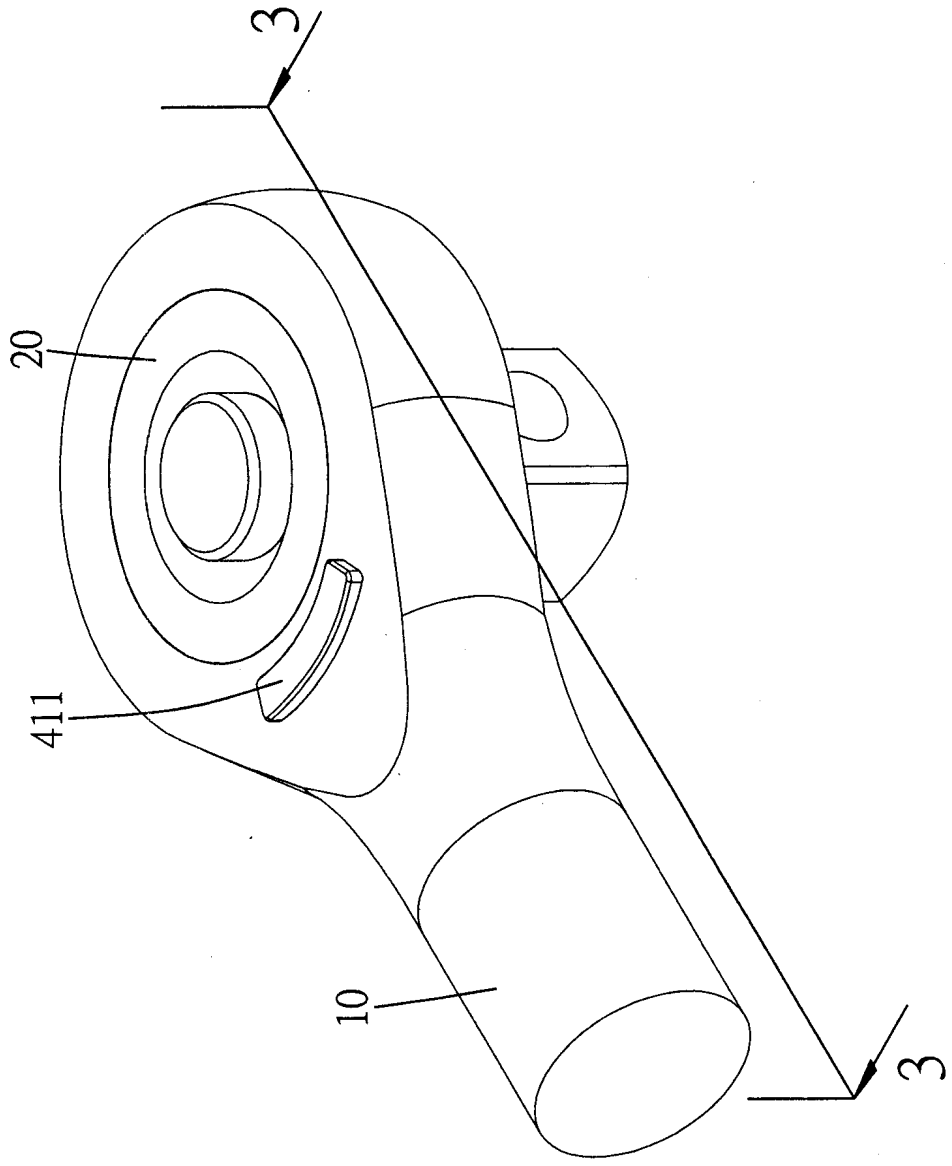


圖 一

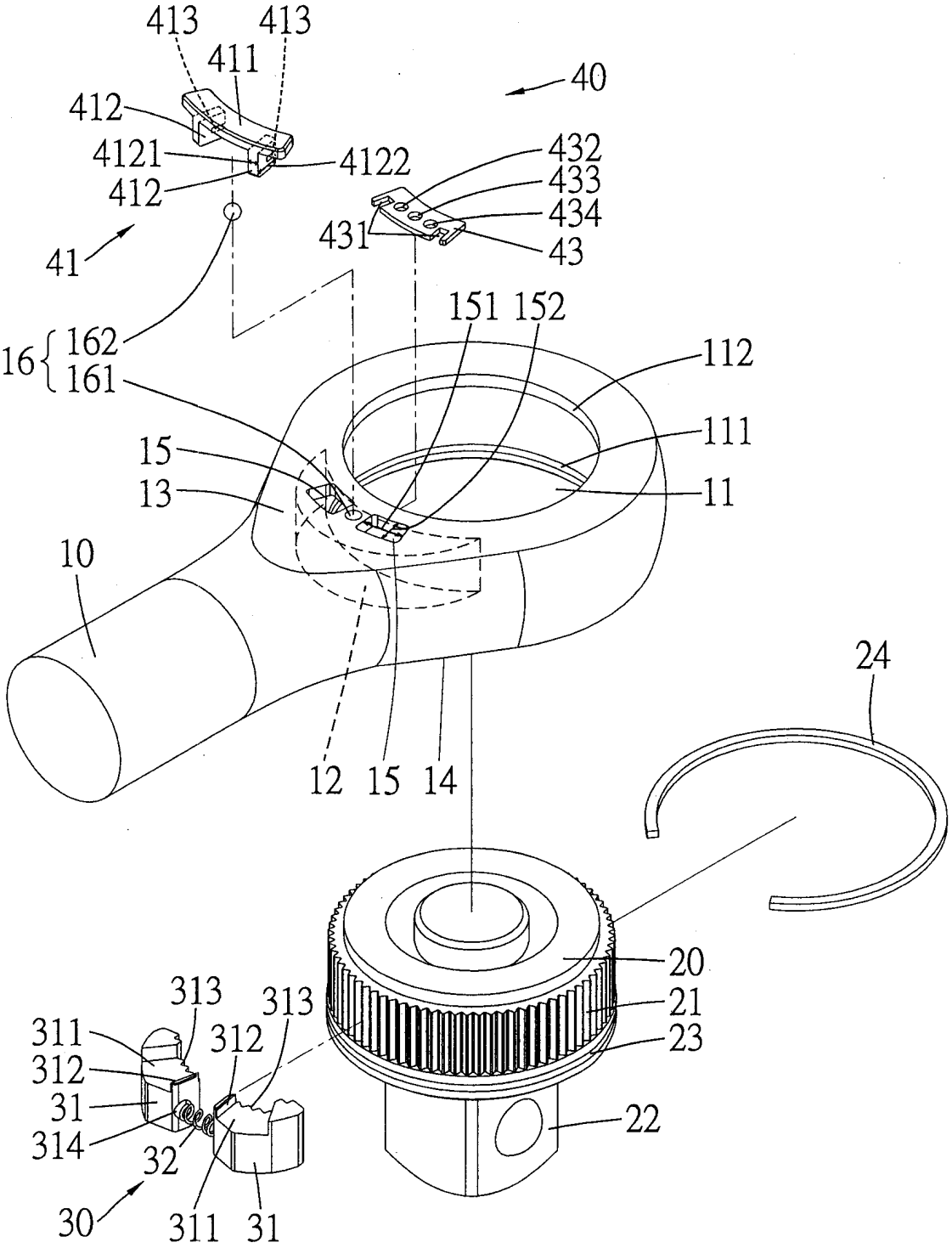
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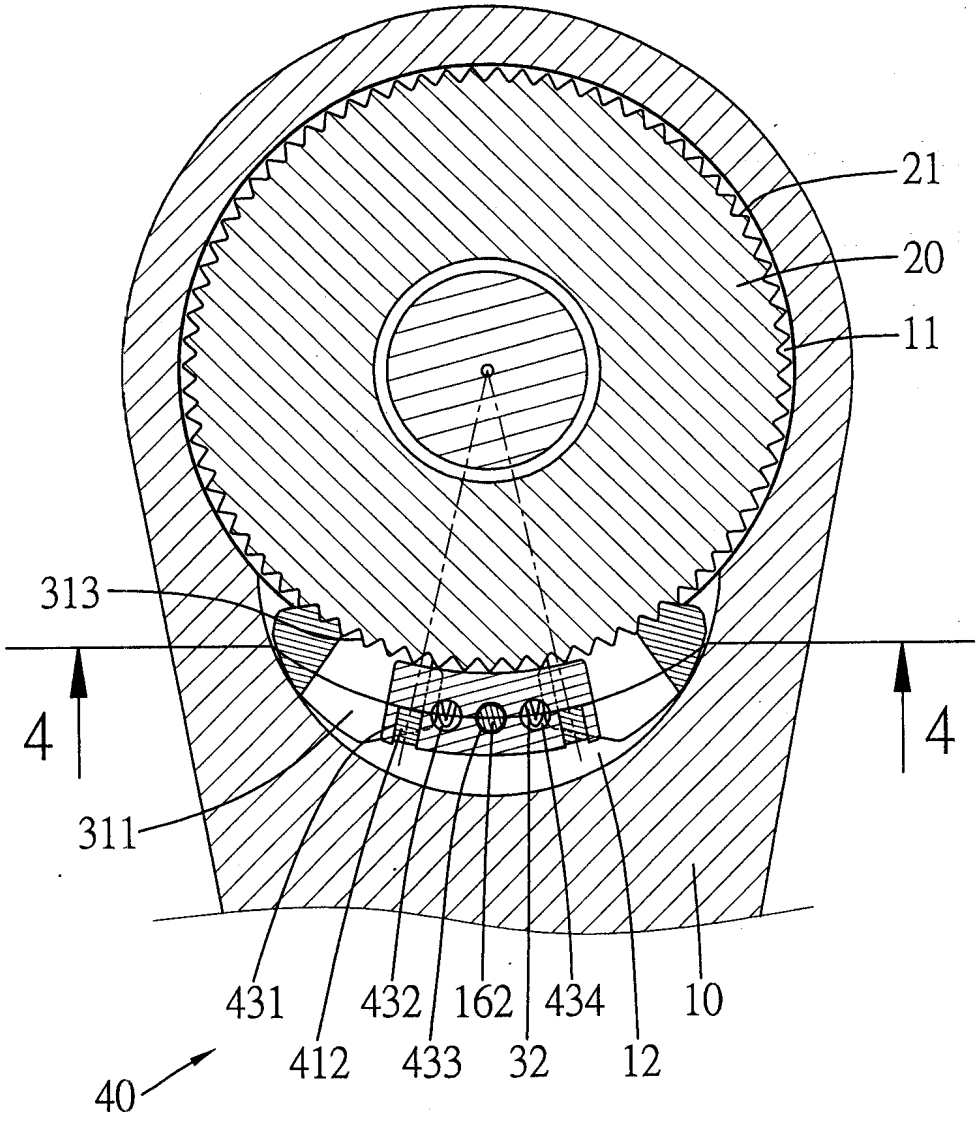
圖 二

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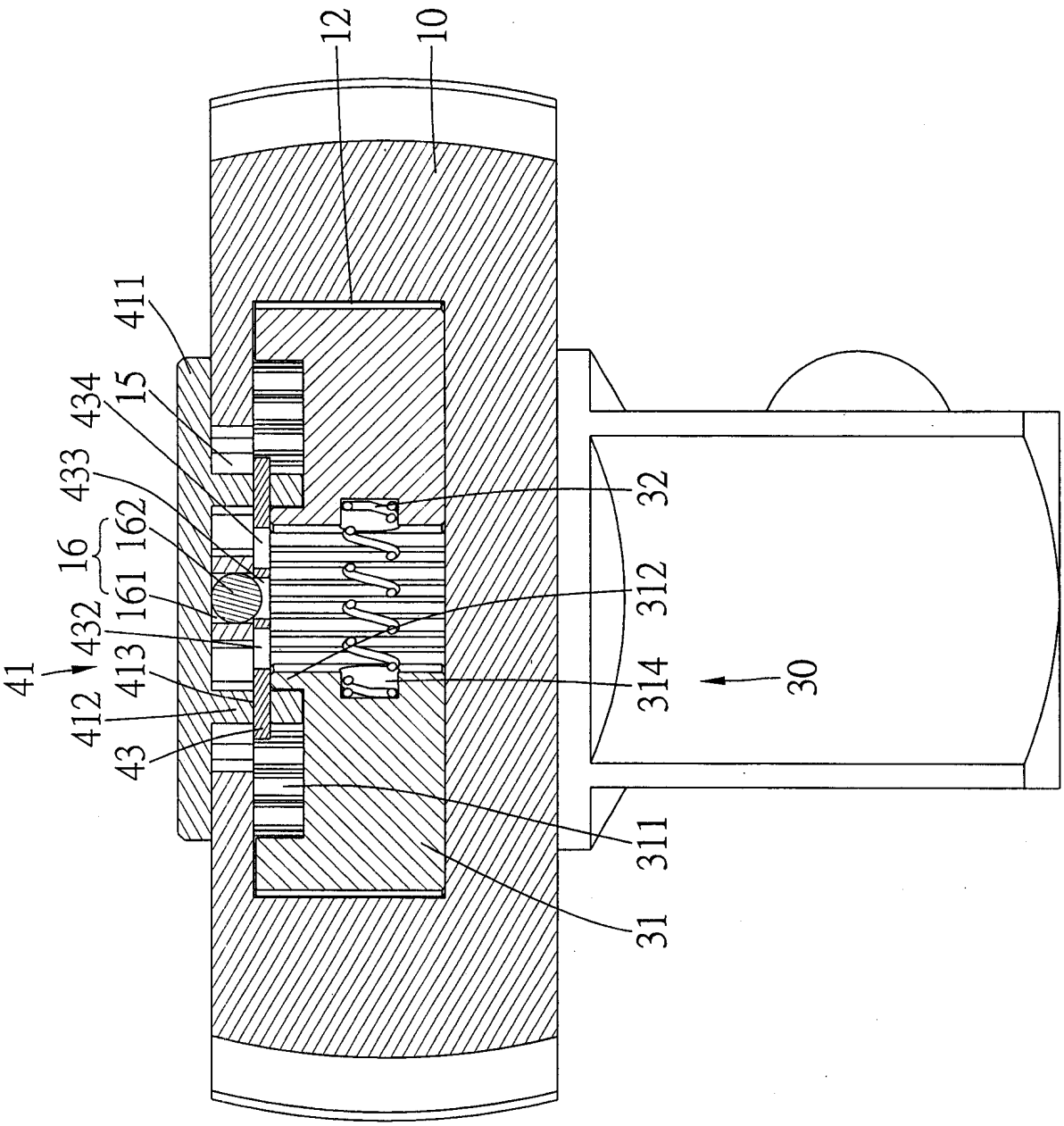
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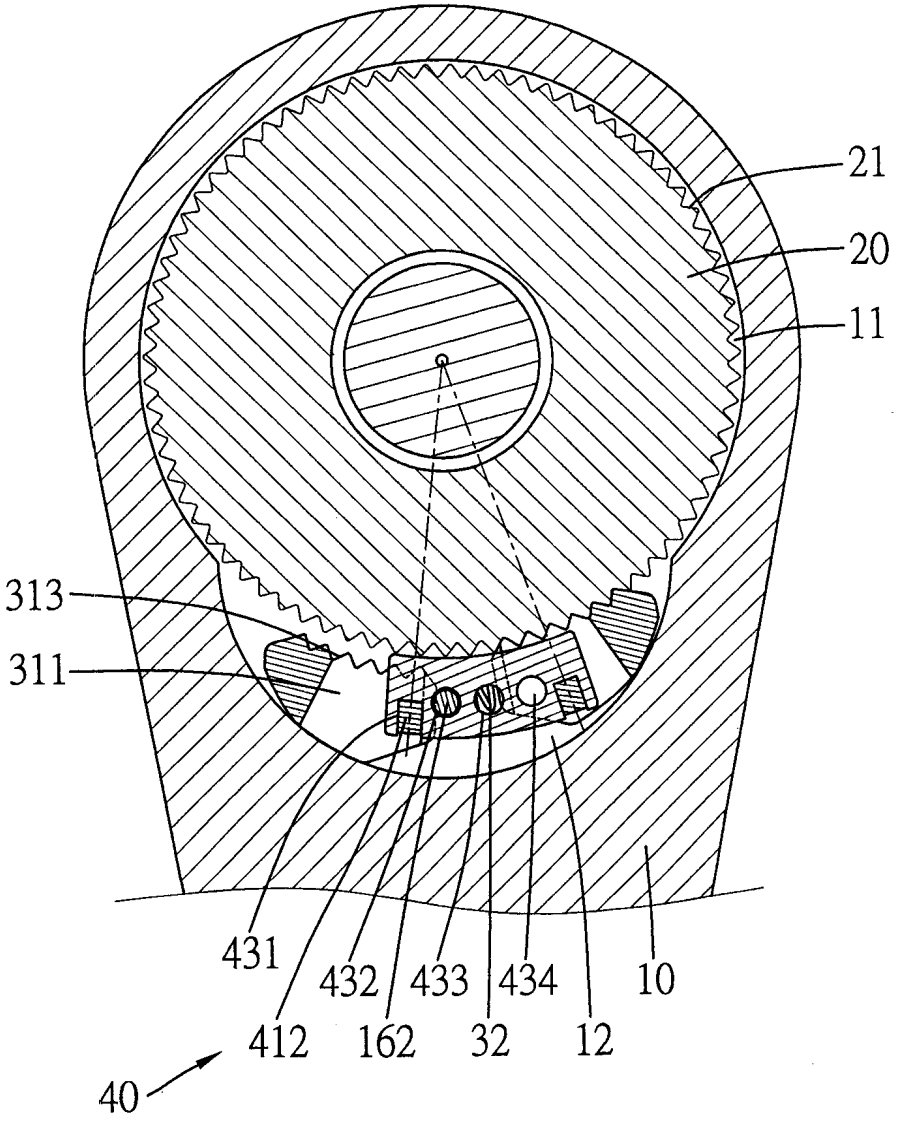


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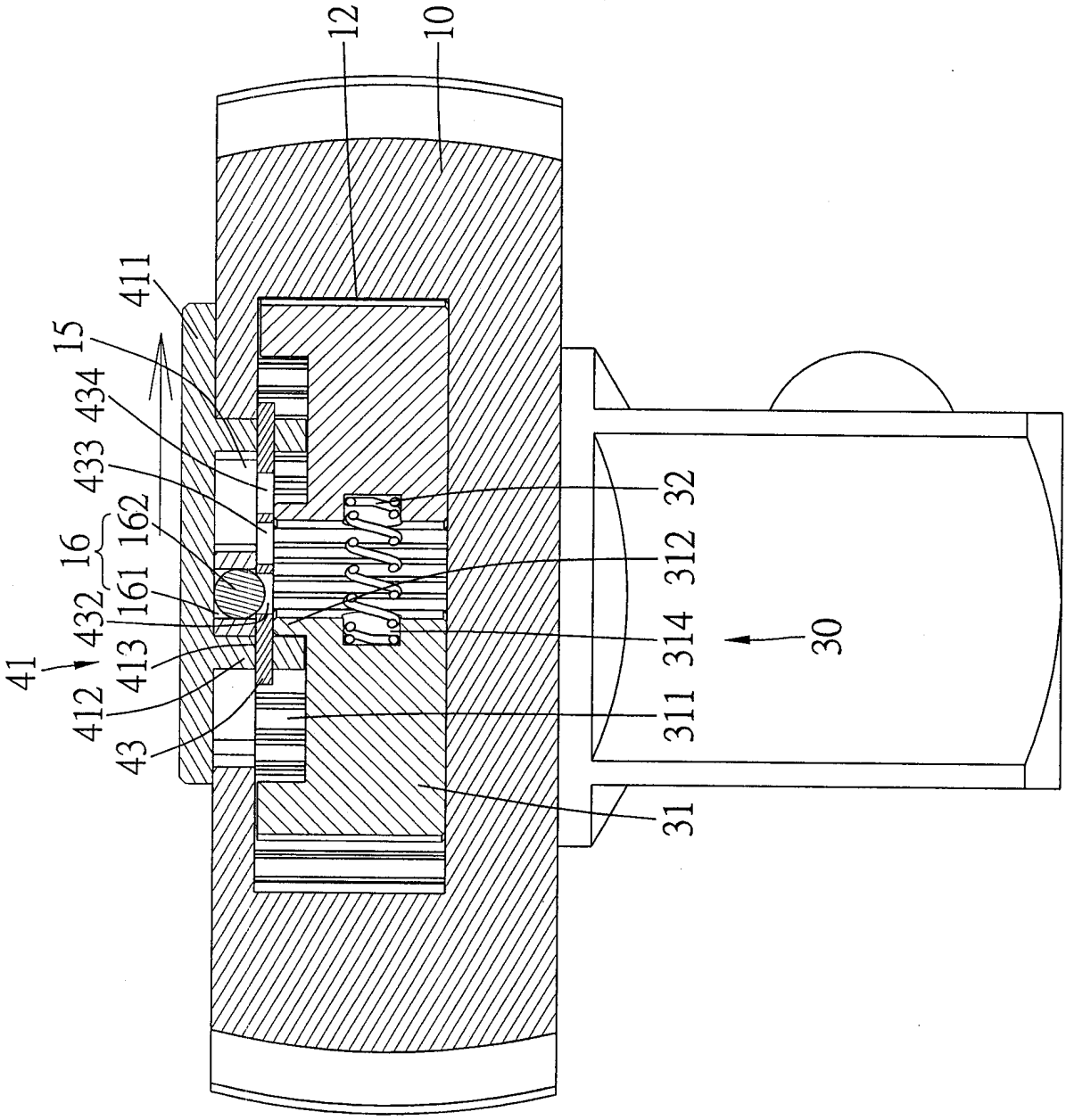
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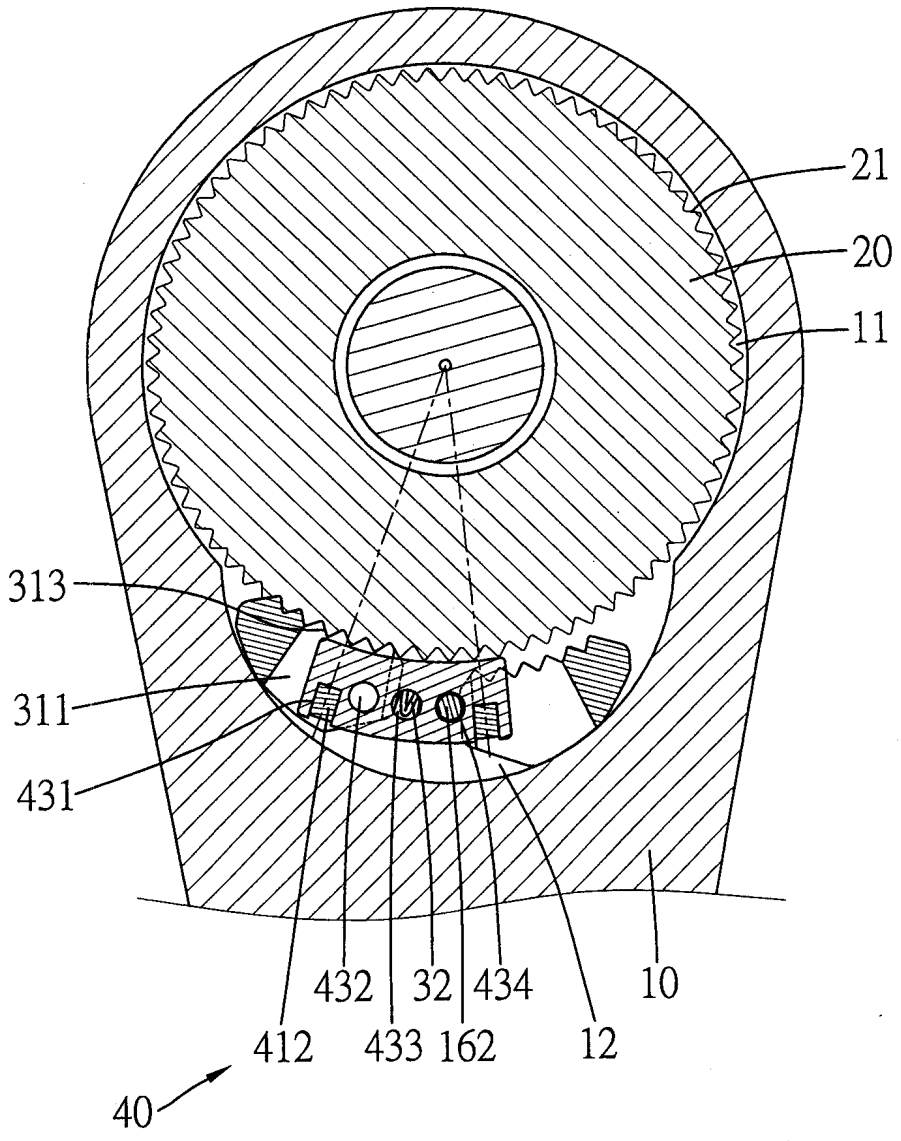
圖 六

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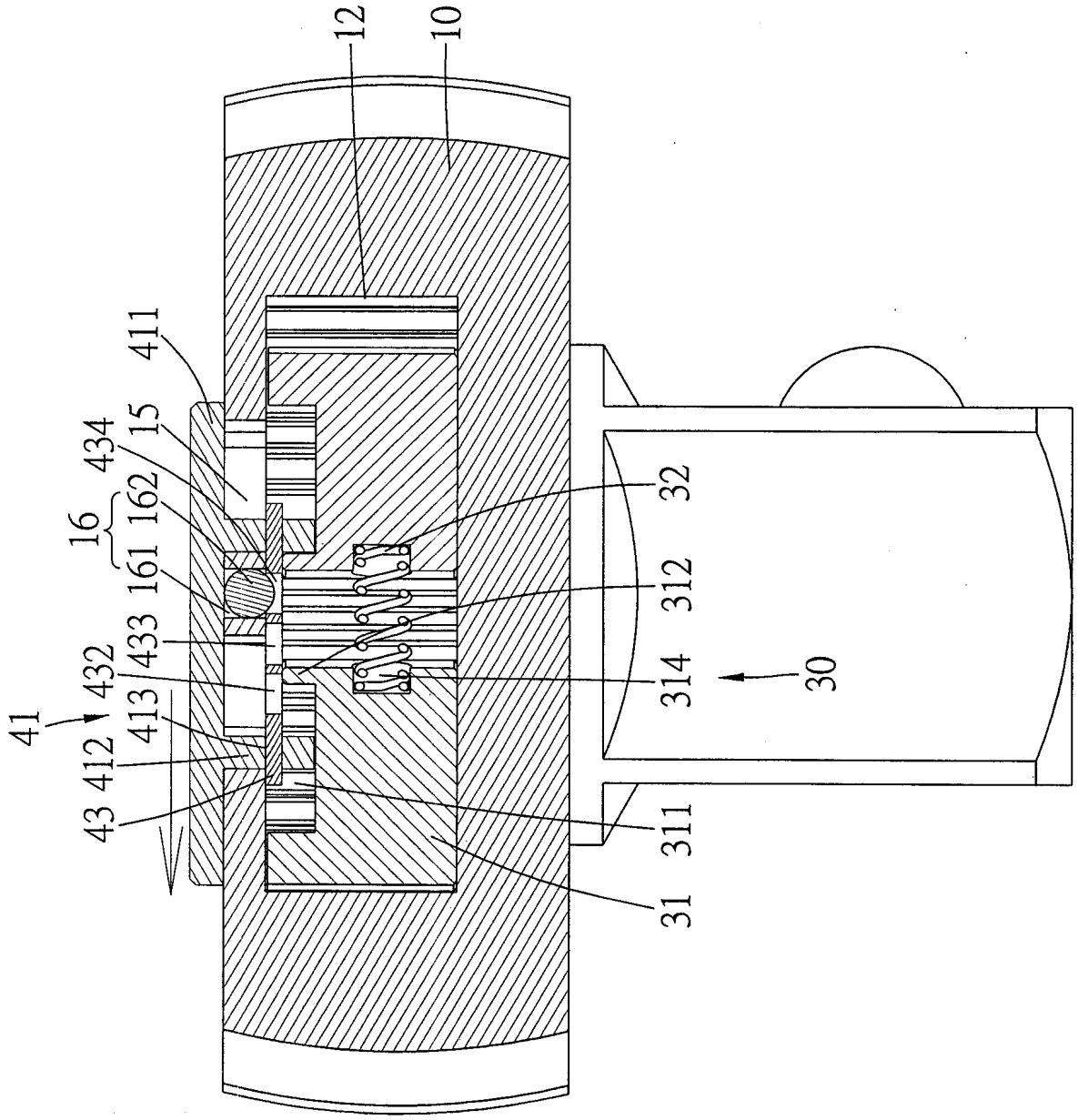
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圖 八

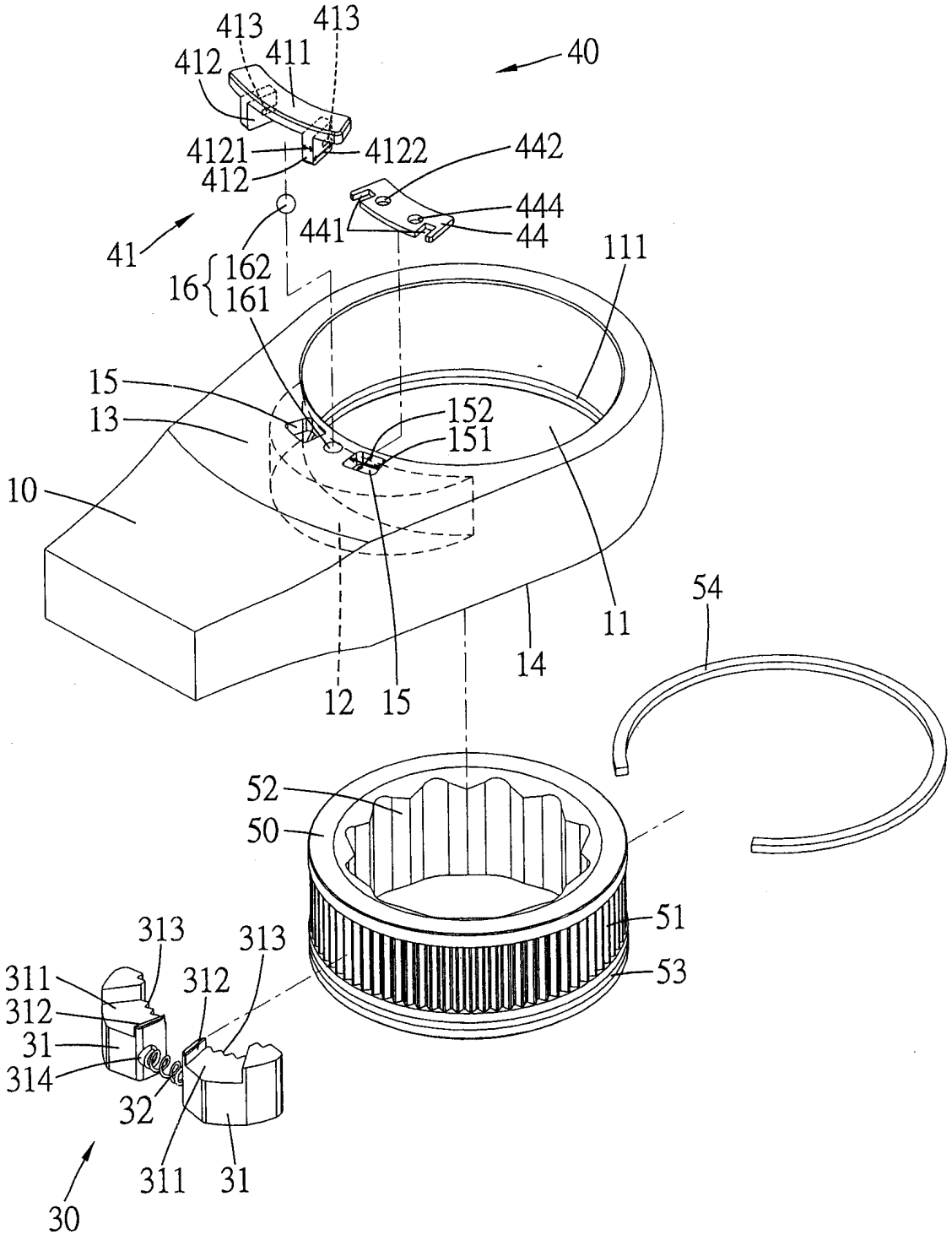
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圖 九

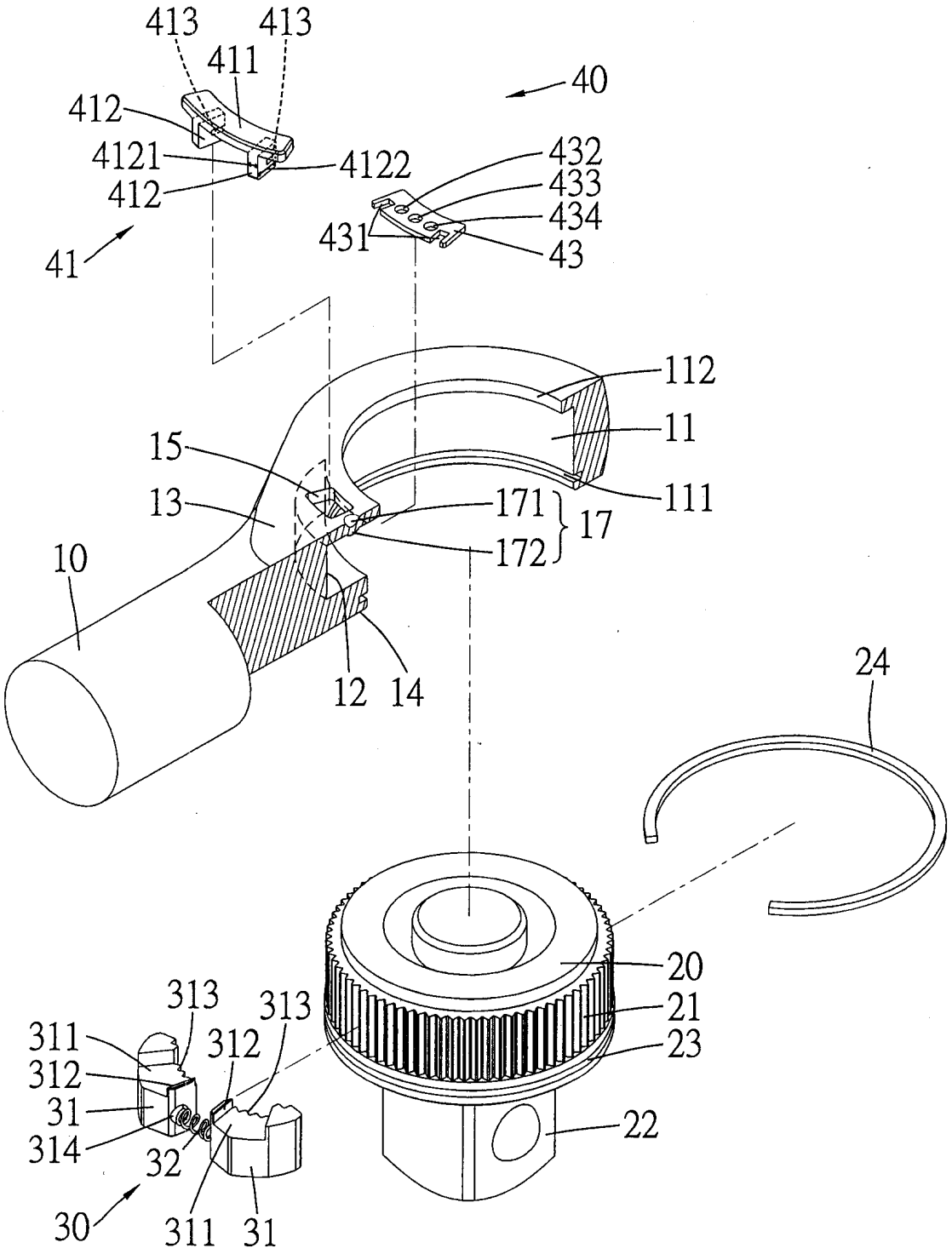
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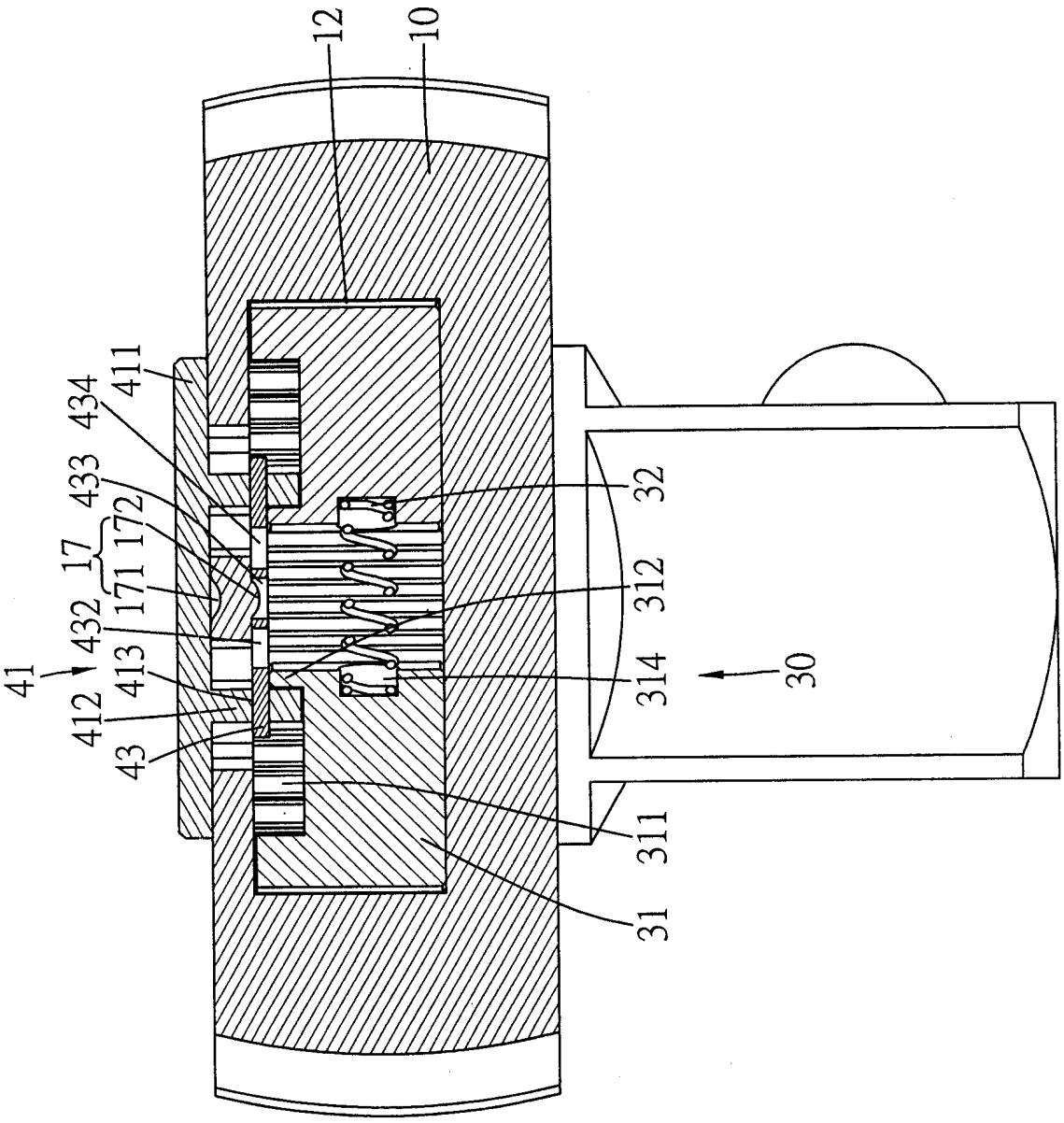
圖 十




圖十一

US007146883B2

附件一

(12) **United States Patent**
**Chen**

(10) **Patent No.: US 7,146,883 B2**
(45) **Date of Patent: Dec. 12, 2006**

(54) **WRENCH DRIVEN DIRECTLY TO CHANGE ITS DIRECTION OF OPERATION**

(76) Inventor: **Terence Chen**, No. 325, Yungching Rd., Dungshan Shiang, Ilan (TW)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **11/206,836**

(22) Filed: **Aug. 19, 2005**

(65) **Prior Publication Data**

US 2006/0156868 A1 Jul. 20, 2006

(30) **Foreign Application Priority Data**

Jan. 14, 2005 (TW) ..... 94101253 A

(51) **Int. Cl.**
*B25B 13/46* (2006.01)

(52) **U.S. Cl.** ..... **81/63.2**; 81/61; 81/62; 81/63

(58) **Field of Classification Search** ..... 81/61, 81/62, 63, 63.2
See application file for complete search history.

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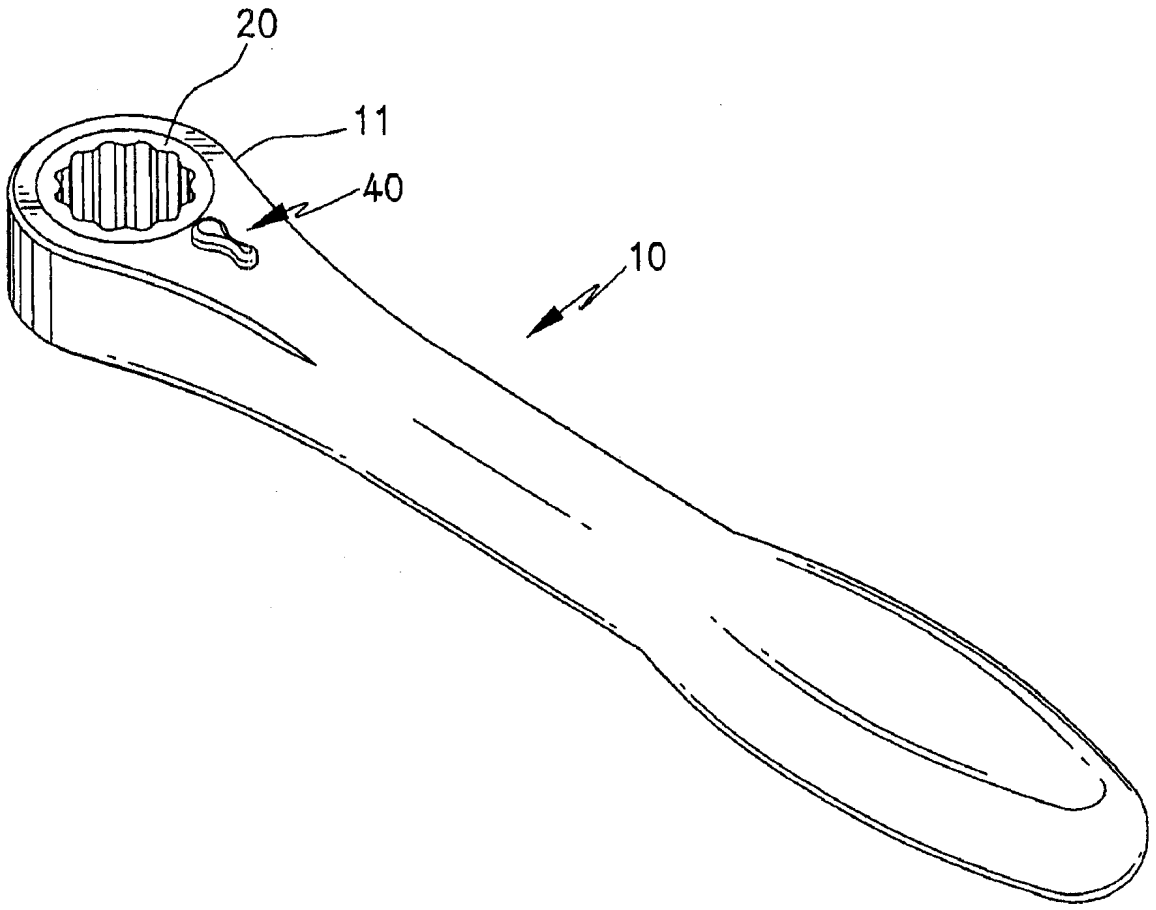
*Primary Examiner*—Joseph J. Hail, III
*Assistant Examiner*—Santese McDonald
(74) *Attorney, Agent, or Firm*—Rosenberg, Klein & Lee

(57) **ABSTRACT**

A wrench includes a wrench body, an actuating member, a pawl member, a direction control knob, a positioning device, and a driving member. Thus, the direction control knob is mounted on the drive head of the wrench body after assembly of the pawl member and the driving member, so that the direction control knob is mounted on the drive head of the wrench body easily, rapidly and conveniently, thereby facilitating assembly of the wrench and thereby decreasing costs of production.

**21 Claims, 9 Drawing Sheets**



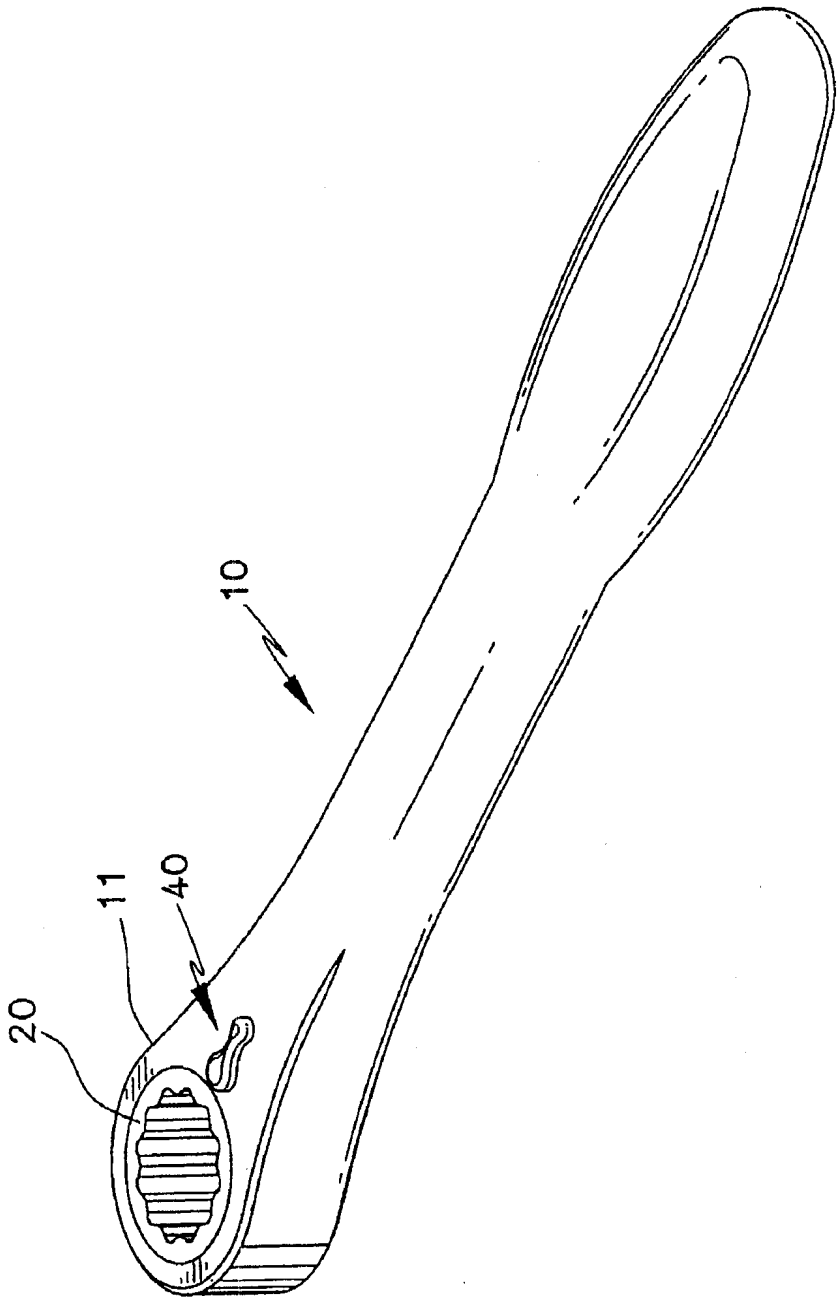



FIG. 1

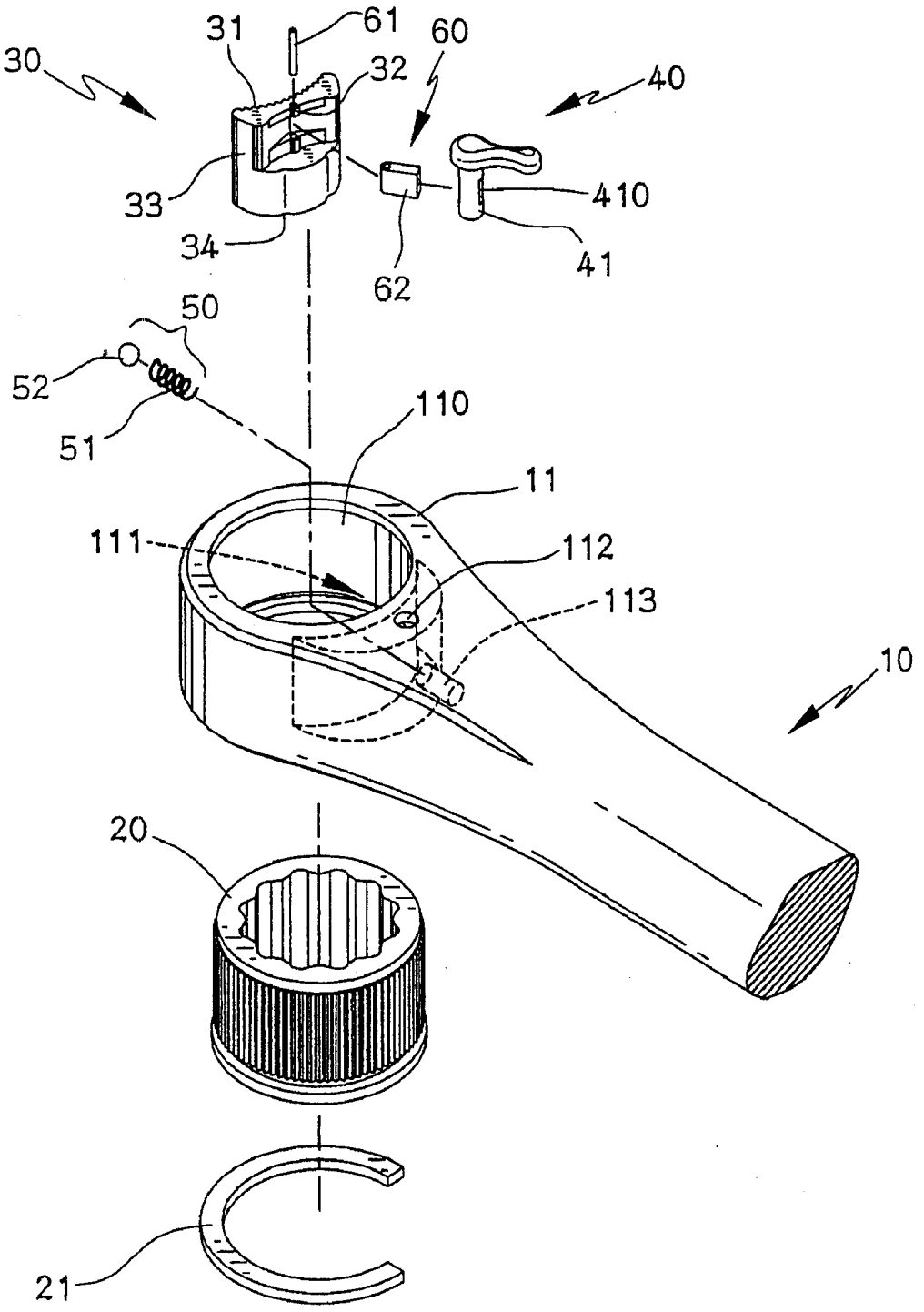



FIG. 2

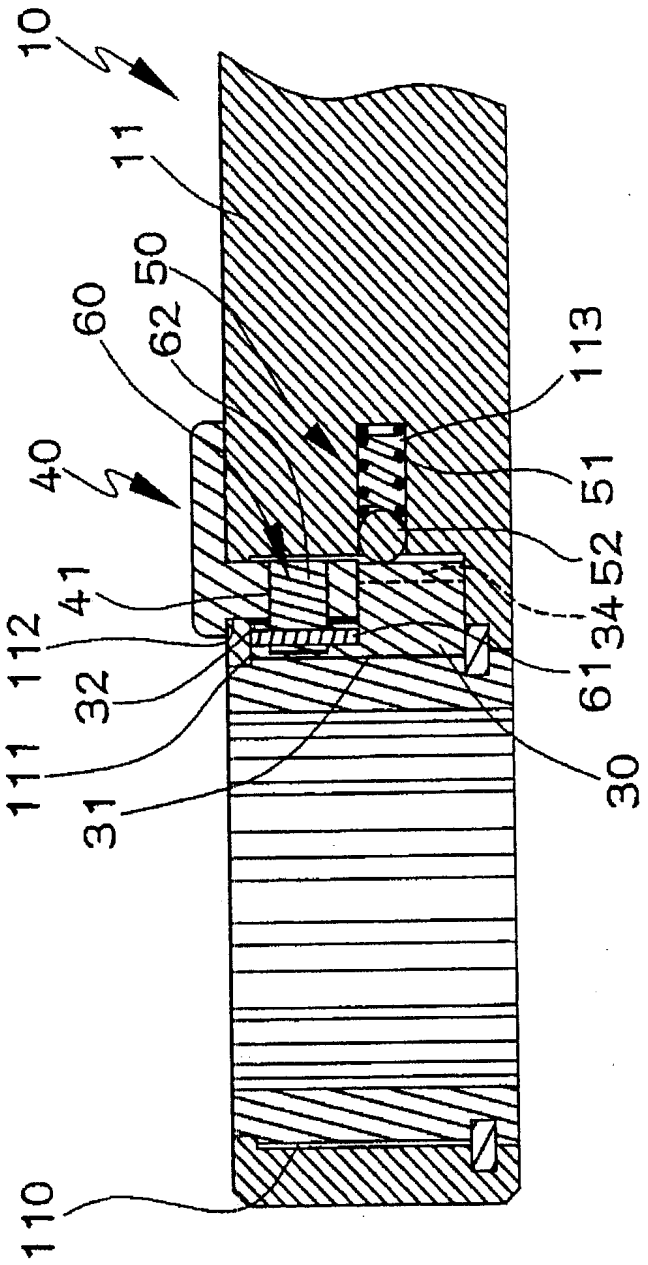



FIG. 3

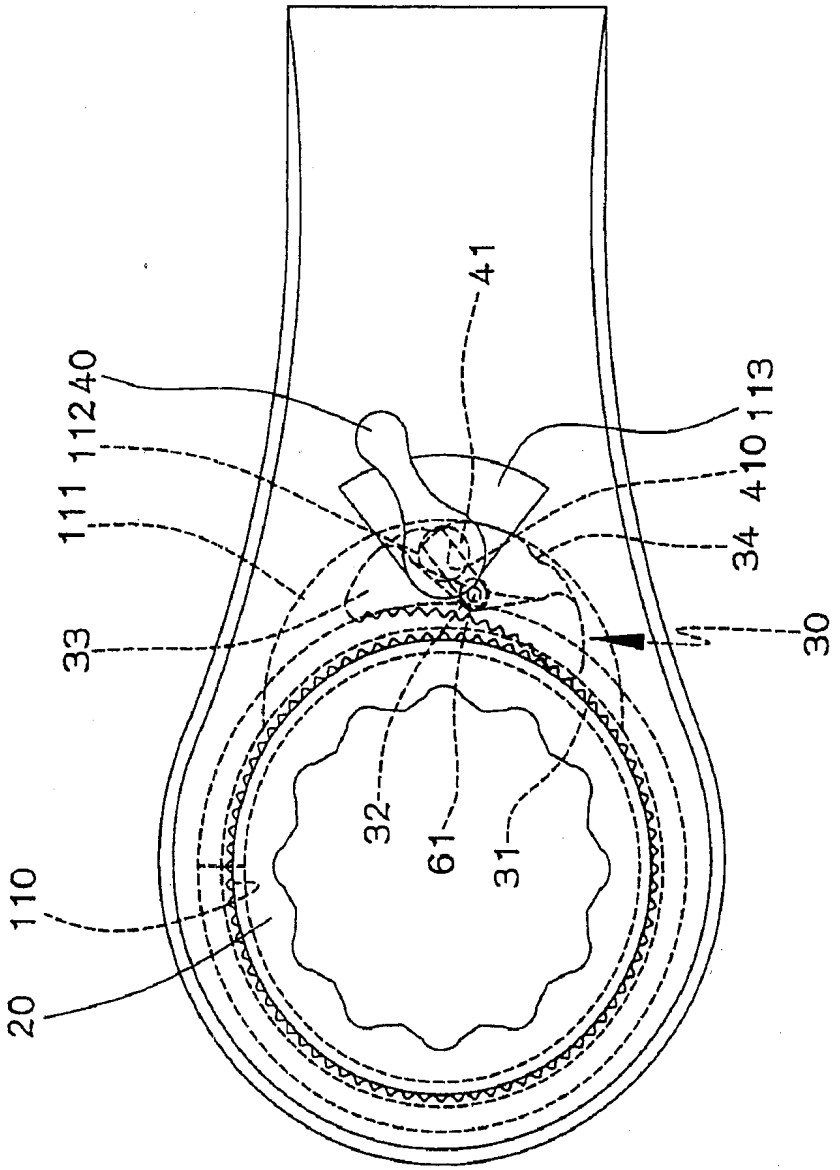



FIG. 4

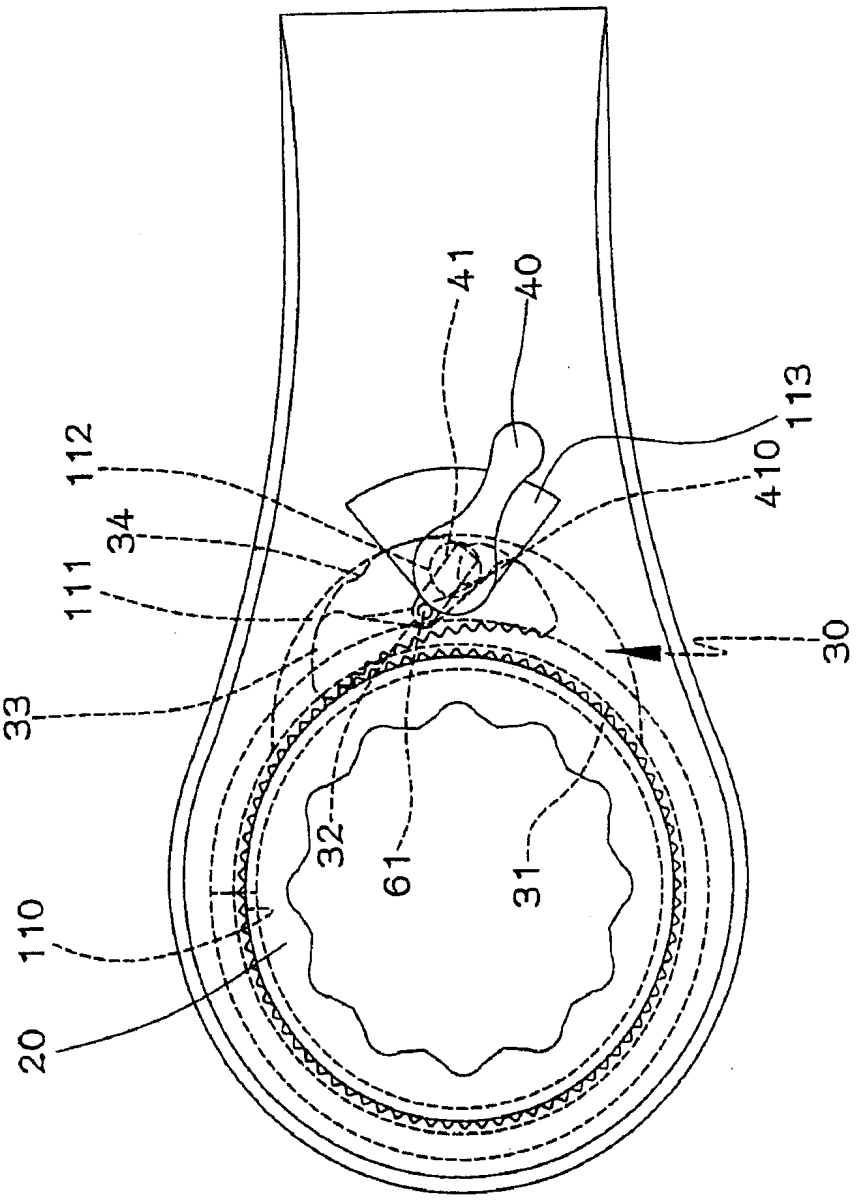



FIG. 5

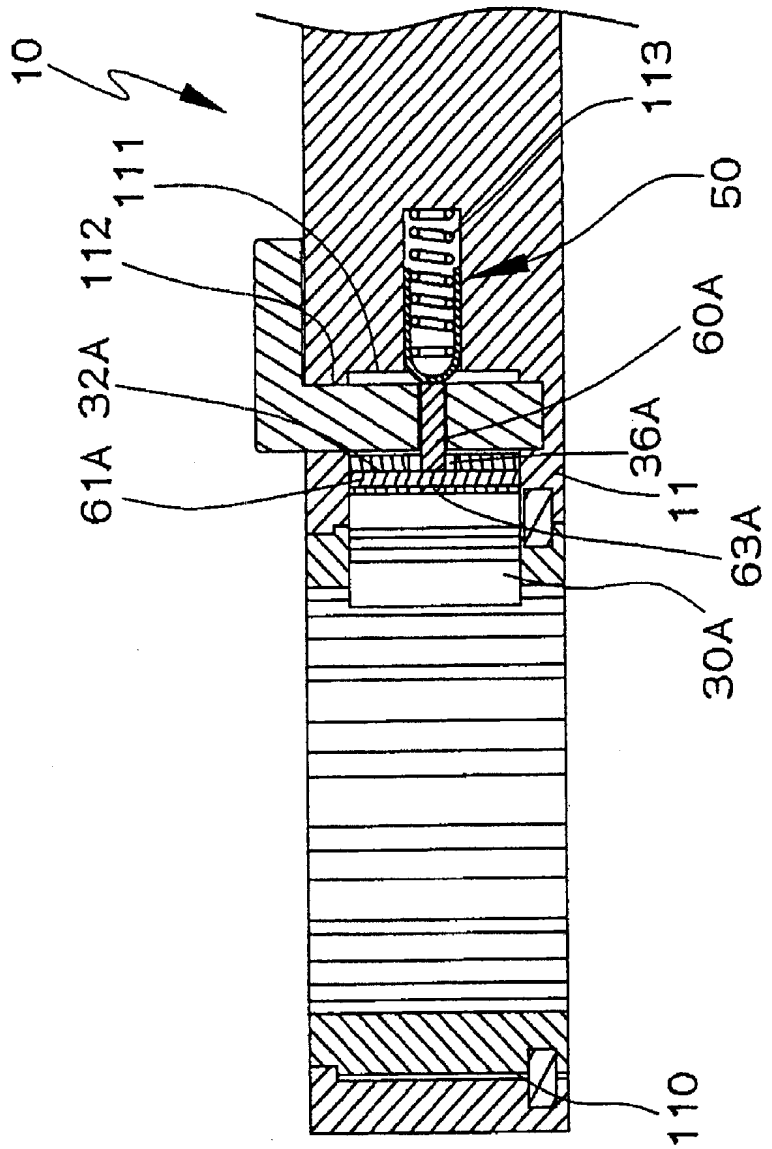



FIG. 6

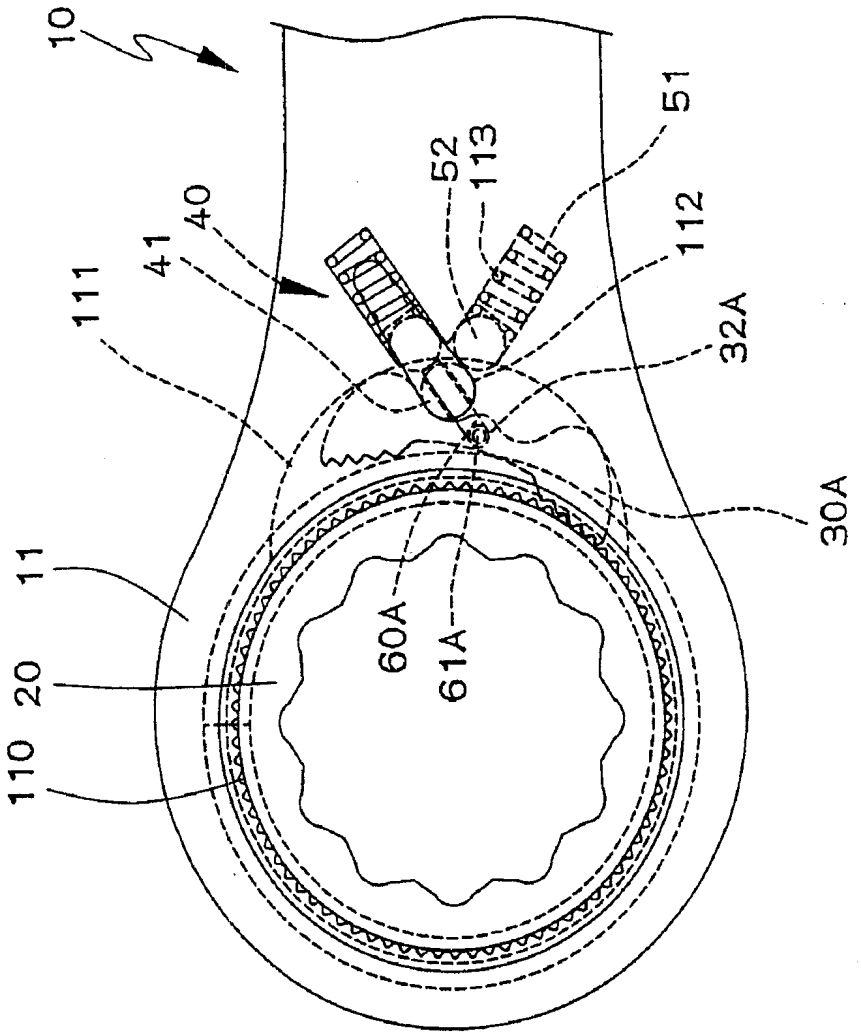



FIG. 7

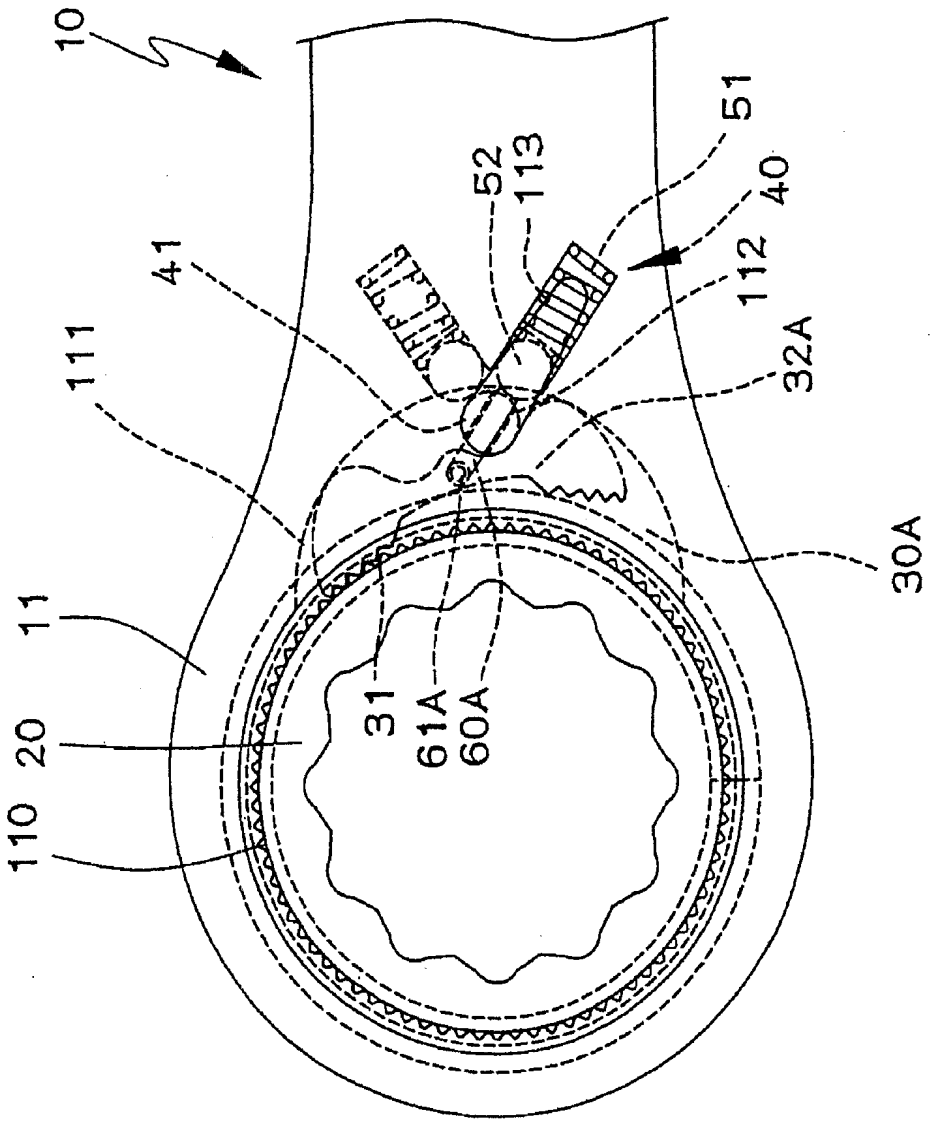



FIG. 8

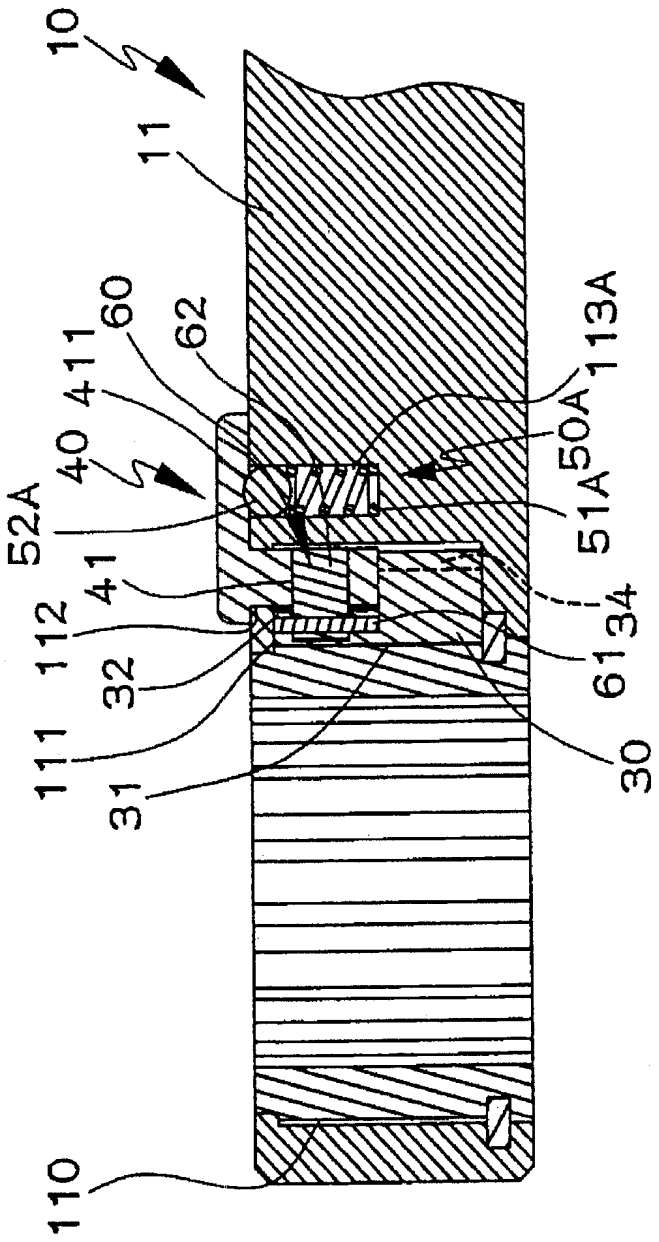



FIG. 9

US 7,146,883 B2



# WRENCH DRIVEN DIRECTLY TO CHANGE ITS DIRECTION OF OPERATION

## BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a wrench, and more particularly to a wrench that is driven directly to change its direction of operation.

2. Description of the Related Art

A conventional wrench comprises a wrench body, an actuating member mounted in the wrench body, a pawl member mounted in the wrench body and having a first side engaged with the actuating member, and a direction control knob member mounted on the wrench body to control the operation direction of the pawl member. The direction control knob is formed with a hole to receive a spring and a drive member which is pushed by the spring to press a second side of the pawl member. However, the direction control knob has to provide a hole to receive the spring and the drive member, so that the direction control knob is not made easily, thereby increasing costs of fabrication. In addition, the direction control knob member is secured on the wrench body by a C-shaped snap ring, thereby causing inconvenience in assembly of the direction control knob.

## SUMMARY OF THE INVENTION

The present invention is to mitigate and/or obviate the disadvantage of the conventional wrench.

The primary objective of the present invention is to provide a wrench that is driven directly to change its direction of operation exactly and rapidly.

Another objective of the present invention is to provide a wrench, wherein the direction control knob is mounted on the drive head of the wrench body after assembly of the pawl member and the driving member, so that the direction control knob is mounted on the drive head of the wrench body easily, rapidly and conveniently, thereby facilitating assembly of the wrench and thereby decreasing costs of production.

A further objective of the present invention is to provide a wrench, wherein the shaft of the direction control knob directly drives the driving member to operate the pawl member so that the pawl member is operated exactly and rapidly, thereby facilitating a user operating the drive head of the wrench body to rotate a workpiece.

In accordance with the present invention, there is provided a wrench, comprising:

a wrench body having an end provided with a drive head having an inside formed with a mounting recess having a side formed with a receiving recess connected to the mounting recess;

an actuating member mounted in the mounting recess of the drive head;

a pawl member pivotally mounted in the receiving recess of the drive head and engaged with the actuating member;

a direction control knob rotatably mounted on the drive head and having a shaft extended into the receiving recess of the drive head;

a driving member having a first end pivotally connected with the pawl member and a second end extended into the shaft of the direction control knob so that the driving member is moved by the shaft of the direction control knob to control movement of the pawl member.



Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a wrench in accordance with the preferred embodiment of the present invention;

FIG. **2** is a partially cut-away exploded perspective view of the wrench as shown in FIG. **1**;

FIG. **3** is a partially cut-away plan cross-sectional view of the wrench as shown in FIG. **1**;

FIG. **4** is a partially cut-away top plan cross-sectional view of the wrench as shown in FIG. **1**;

FIG. **5** is a schematic operational view of the wrench as shown in FIG. **4**;

FIG. **6** is a partially cut-away plan cross-sectional view of a wrench in accordance with another preferred embodiment of the present invention;

FIG. **7** is a top plan view of the wrench as shown in FIG. **6**;

FIG. **8** is a schematic operational view of the wrench as shown in FIG. **7**, and

FIG. **9** shows yet another embodiment of the wrench of the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings and initially to FIGS. **1–5**, a wrench in accordance with the preferred embodiment of the present invention comprises a wrench body **10**, an actuating member **20**, a pawl member **30**, a direction control knob **40**, a positioning device **50**, and a driving member **60**.

The wrench body **10** has an end provided with a drive head **11** having an inside formed with a mounting recess **110** having a side formed with a receiving recess **111** connected to the mounting recess **110**. The drive head **11** of the wrench body **10** has an end face formed with a through hole **112** connected to the receiving recess **111**. The receiving recess **111** of the drive head **11** has a side formed with a positioning hole **113**.

The actuating member **20** is a ratchet wheel mounted in the mounting recess **110** of the drive head **11** by a C-shaped snap ring **21**.

The pawl member **30** is pivotally mounted in the receiving recess **111** of the drive head **11**.

The direction control knob **40** is rotatably mounted on the drive head **11** and has a shaft **41** extended through the through hole **112** of the drive head **11** into the receiving recess **111** of the drive head **11** and located between the pawl member **30** and a bottom wall of the receiving recess **111** of the drive head **11**.

The positioning device **50** is mounted in the positioning hole **113** of the drive head **11** and includes an elastic member **51** (such as a spring) and a positioning member **52** (such as a ball). The positioning member **52** of the positioning device **50** is partially protruded from the positioning hole **113** of the drive head **11** to position the direction control knob **40** and the driving member **60**.

In the preferred embodiment of the present invention, the driving member **60** has a first end pivotally connected with the pawl member **30** and a second end extended into the shaft **41** of the direction control knob **40**. In addition, the shaft **41** of the direction control knob **40** has a driving slot **410** extended through the shaft **41**.

The pawl member **30** has a first side provided with two pivot portions **32** (such as two pivot ears each having a pivot hole) for pivoting the first end of the driving member **60** and a second side provided with an engaging portion **31** (such as teeth) engaged with the actuating member **20**. The second side of the pawl member **30** has a periphery formed with two locating portions **34** (such as locating grooves) for locating the positioning member **52** of the positioning device **50**. The second side of the pawl member **30** has two ends each provided with an actuating edge **33** to mate with the receiving recess **111** of the drive head **11**.

The driving member **60** includes a cylindrical pivot **61** pivotally mounted on the pivot portions **32** of the pawl member **30**, and a driving portion **62** having a first end pivotally mounted on the pivot **61** so that the driving member **60** is pivotally connected with the pawl member **30** and a second end inserted into the driving slot **410** of the shaft **41** of the direction control knob **40**.

As shown in FIGS. **4** and **5**, when the direction control knob **40** is rotated, the shaft **41** is rotated to rotate the driving slot **410** which moves the driving member **60** which moves the pawl member **30** so as to change the operation direction of the pawl member **30** so that the pawl member **30** drives the actuating member **20** in two opposite directions. At this time, the positioning member **52** of the positioning device **50** is locked in either one of the two locating portions **34** of the pawl member **30** to position the pawl member **30**.

Referring to FIGS. **6–8**, the pawl member **30A** has a first side provided with a pivot portion **32A** having a mediate section formed with an open pivot zone **36A**, and the driving member **60A** has a pivot end **63A** pivotally mounted in the pivot zone **36A** of the pivot portion **32A** of the pawl member **30A** by a pivot **61A** which is extended through the pivot portion **32A** of the pawl member **30A** so that the driving member **60A** is pivotally connected with the pawl member **30A**. In addition, the receiving recess **111** of the drive head **11** has a side formed with two positioning holes **113**, and the wrench comprises two positioning devices **50** each mounted in the respective positioning hole **113** of the drive head **11** and each aligned with a rotation direction of the driving slot **410** of the shaft **41** of the direction control knob **40** so that when the driving slot **410** of the shaft **41** of the direction control knob **40** is rotated to align with either one of the two positioning devices **50**, the direction control knob **40** is positioned by the respective positioning device **50**.

Accordingly, the direction control knob **40** is mounted on the drive head **11** of the wrench body **10** after assembly of the pawl member **30** and the driving member **60**, so that the direction control knob **40** is mounted on the drive head **11** of the wrench body **10** easily, rapidly and conveniently, thereby facilitating assembly of the wrench and thereby decreasing costs of production. In addition, the shaft **41** of the direction control knob **40** directly drives the driving member **60** to operate the pawl member **30** so that the pawl member **30** is operated exactly and rapidly, thereby facilitating a user operating the drive head **11** of the wrench body **10** to rotate a workpiece.

As shown in FIG. **9** which shows yet another embodiment, wherein a positioning hole **113A** is defined in a top of the wrench body **10** and located corresponding to the direction control knob **40** so as to receive the elastic member **51A** and the positioning member **52A** of the positioning device **50A**. The direction control knob **40** has a plurality of positioning notches **411** defined in an underside thereof so as to receive the positioning member **52A** at desired direction to show the direction that the wrench is to be operated.



Although the invention has been explained in relation to its preferred embodiment(s) as mentioned above, it is to be understood that many other possible modifications and variations can be made without departing from the scope of the present invention. It is, therefore, contemplated that the appended claim or claims will cover such modifications and variations that fall within the true scope of the invention.

What is claimed is:

**1**. A wrench, comprising:

a wrench body having an end provided with a drive head having an inside formed with a mounting recess having a side formed with a receiving recess connected to the mounting recess;

an actuating member mounted in the mounting recess of the drive head;

a pawl member pivotally mounted in the receiving recess of the drive head and engaged with the actuating member, the pawl member having a side provided with a pivot portion;

a direction control knob rotatably mounted on the drive head and having a shaft extended into the receiving recess of the drive head, the shaft of the direction control knob having a driving slot;

a driving member having a driving portion having a first end including a pivot pivotally connected to the pivot portion of the pawl member and a second end inserted into the driving slot of the shaft of the direction control knob so that the driving member is moved by the shaft of the direction control knob to control movement of the pawl member; and

at least one positioning device connected to the drive head and located corresponding to the direction control knob or the pawl member.

**2**. The wrench in accordance with claim **1**, wherein the driving slot is extended through the shaft of the direction control knob.

**3**. The wrench in accordance with claim **1**, wherein the receiving recess of the drive head has a side formed with a positioning hole, and the at least one positioning device is mounted in the positioning hole of the drive head.

**4**. The wrench in accordance with claim **3**, wherein the at least one positioning device includes an elastic member and a positioning member, and the positioning member of the at least one positioning device is partially protruded from the positioning hole of the drive head to position the direction control knob and the driving member.

**5**. The wrench in accordance with claim **1**, wherein the pawl member has a side provided with two pivot portions for pivoting the first end of the driving member.

**6**. The wrench in accordance with claim **1**, wherein the pawl member has a periphery formed with at least one locating portion corresponding to the at least one positioning device for locating the positioning member of the positioning device.

**7**. The wrench in accordance with claim **1**, wherein the pawl member has a side having two ends each provided with an actuating edge to mate with the receiving recess of the drive head.

**8**. The wrench in accordance with claim **1**, wherein the drive head of the wrench body has an end face formed with a through hole connected to the receiving recess to allow passage of the shaft of the direction control knob.

**9**. The wrench in accordance with claim **1**, wherein the pawl member has a side provided with a pivot portion having a mediate section formed with an open pivot zone, and the driving member has a pivot end pivotally mounted in the pivot zone of the pivot portion of the pawl member by

a pivot which is extended though the pivot portion of the pawl member so that the driving member is pivotally connected with the paw member.

10. The wrench in accordance with claim 9, wherein the shaft of the direction control knob has a driving slot, and the driving member has a driving portion inserted into the driving slot of the shaft of the direction control knob.

11. The wrench in accordance with claim 1, wherein the receiving recess of the drive head has a side formed with at least one positioning hole, and the at least one positioning device is mounted in the at least one positioning hole of the drive head.

12. The wrench in accordance with claim 11, wherein the at least one positioning device includes an elastic member and a positioning member, and the positioning member of the at least one positioning device is partially protruded from the at least one positioning hole of the drive head to position the direction control knob and the driving member.

13. The wrench in accordance with claim 1, wherein the shaft of the direction control knob has a driving slot, and the at least one positioning device is aligned with a rotation direction of the driving slot of the shaft of the direction control knob so that when the driving slot of the shaft of the direction control knob is rotated to align with the at least one positioning device, the direction control knob is positioned by the at least one positioning device.

14. A wrench, comprising:

a wrench body having an end provided with a drive head having an inside formed with a mounting recess having a side formed with a receiving recess connected to the mounting recess;

an actuating member mounted in the mounting recess of the drive head;

a pawl member pivotally mounted in the receiving recess of the drive head and engaged with the actuating member;

a direction control knob rotatably mounted on the drive head and having a shaft extended into the receiving recess of the drive head;

a driving member having a first end pivotally connected with the pawl member and a second end extended into the shaft of the direction control knob so that the driving member is moved by the shaft of the direction control knob to control movement of the pawl member, and

at least one positioning hole defined in a top of the drive head of the wrench body and located corresponding to the direction control knob, at least one positioning device received in the at least one positioning hole, the direction control knob having a plurality of positioning notches defined in an underside thereof and the at least one control device engaged with one of the positioning notches.

15. The wrench in accordance with claim 14, wherein the at least one positioning device includes an elastic member and a positioning member, and the positioning member of the at least one positioning device is partially protruded from the at least one positioning hole of the drive head so as to be engaged with position the one of the positioning notches of the direction control knob.

16. The wrench in accordance with claim 15, wherein the pawl member has a side provided with a pivot portion, the shaft of the direction control knob has a driving slot, and the driving member includes a pivot pivotally mounted on the pivot portion of the pawl. member, and a driving portion having a first end pivotally mounted on the pivot so that the driving member is pivotally connected with the pawl member and a second end inserted into the driving slot of the shaft of the direction control knob.

17. The wrench in accordance with claim 16, wherein the driving slot is extended through the shaft of the direction control knob.

18. The wrench in accordance with claim 14, wherein the pawl member has a side provided with two pivot portions for pivoting the first end of the driving member.

19. The wrench in accordance with claim 14, wherein the pawl member has a periphery formed with at least one locating portion corresponding to the at least one positioning device for locating the positioning member of the positioning device.

20. The wrench in accordance with claim 14, wherein the pawl member has a side having two ends each provided with an actuating edge to mate with the receiving recess of the drive head.

21. A wrench, comprising:

a wrench body having an end provided with a drive head having an inside formed with a mounting recess having a side formed with a receiving recess connected to the mounting recess;

an actuating member mounted in the mounting recess of the drive head;

a pawl member pivotally mounted in the receiving recess of the drive head and engaged with the actuating member;

a direction control knob rotatably mounted on the drive head and having a shaft extended into the receiving recess of the drive head; and

a driving member having a first end pivotally connected with the pawl member and a second end extended into the shaft of the direction control knob so that the driving member is moved by the shaft of the direction control knob to control movement of the pawl member, the pawl member having a side provided with two pivot portions for pivoting the first end of the driving member.

* * * * *

US006981434B2

附件二

(12) **United States Patent**
**Chen**

(10) **Patent No.: US 6,981,434 B2**
(45) **Date of Patent: Jan. 3, 2006**

(54) **REINFORCEMENT STRUCTURE FOR WRENCH HEAD**

(76) Inventor: **Terence Chen**, No. 325, Yungching Rd., Dungshan Shiang, Ilan (TW)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/854,344**

(22) Filed: **May 27, 2004**

(65) **Prior Publication Data**

US 2004/0216564 A1 Nov. 4, 2004

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 10/428,114, filed on May 2, 2003, now Pat. No. 6,857,339.

(51) **Int. Cl.**
*B25B 13/46* (2006.01)

(52) **U.S. Cl.** ..... **81/63.1**; 81/58; 81/60; 192/43.1

(58) **Field of Classification Search** ..... 81/58, 81/58.4, 60–62, 63.1; 192/43.1
See application file for complete search history.

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| 6,789,449 | B2 * | 9/2004 | Liu | 81/63.2 |
| 6,857,339 | B2 * | 2/2005 | Chen | 81/63.1 |

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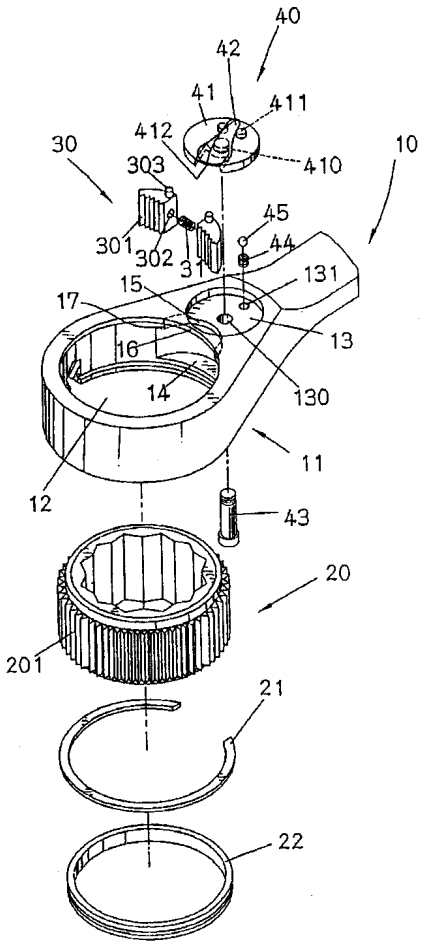
*Primary Examiner*—David B. Thomas
(74) *Attorney, Agent, or Firm*—Rosenberg, Klein & Lee

(57) **ABSTRACT**

A wrench includes a head with an engaging wheel rotatably received in a through hole in the head and a recess is defined in an inner periphery of the through hole so as to receive two pawls therein. A recessed area is defined in a surface of the head and a bridge portion is located between the through hole and the recessed area. A space is defined in an underside of the bridge portion and in communication with the through hole. Each pawl has a protrusion and the space allows the protrusions of the pawl to be inserted in the recess without any orientation adjustment. A control member is rotatably received in the recessed area and has a concavity for retaining the two protrusions therein.

**4 Claims, 8 Drawing Sheets**



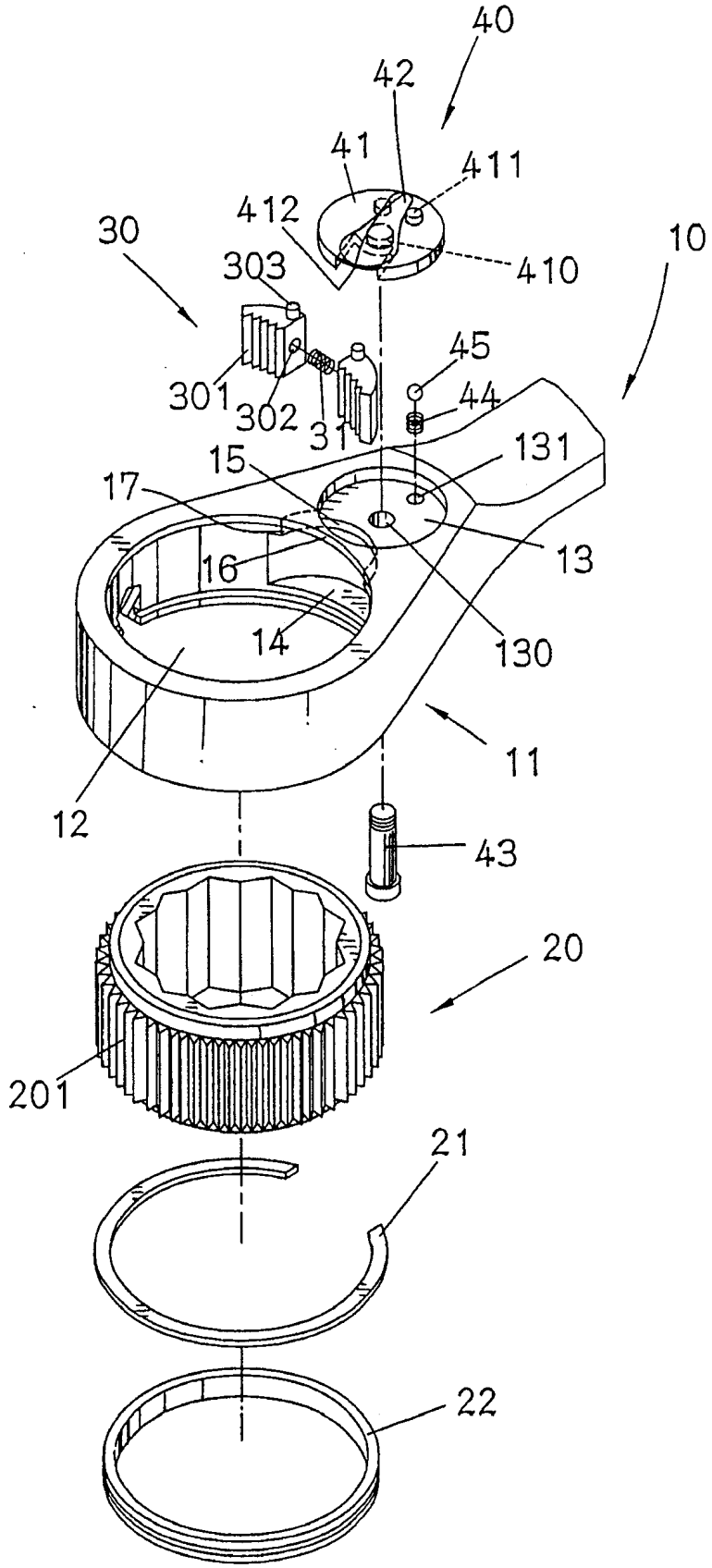

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FIG. 1

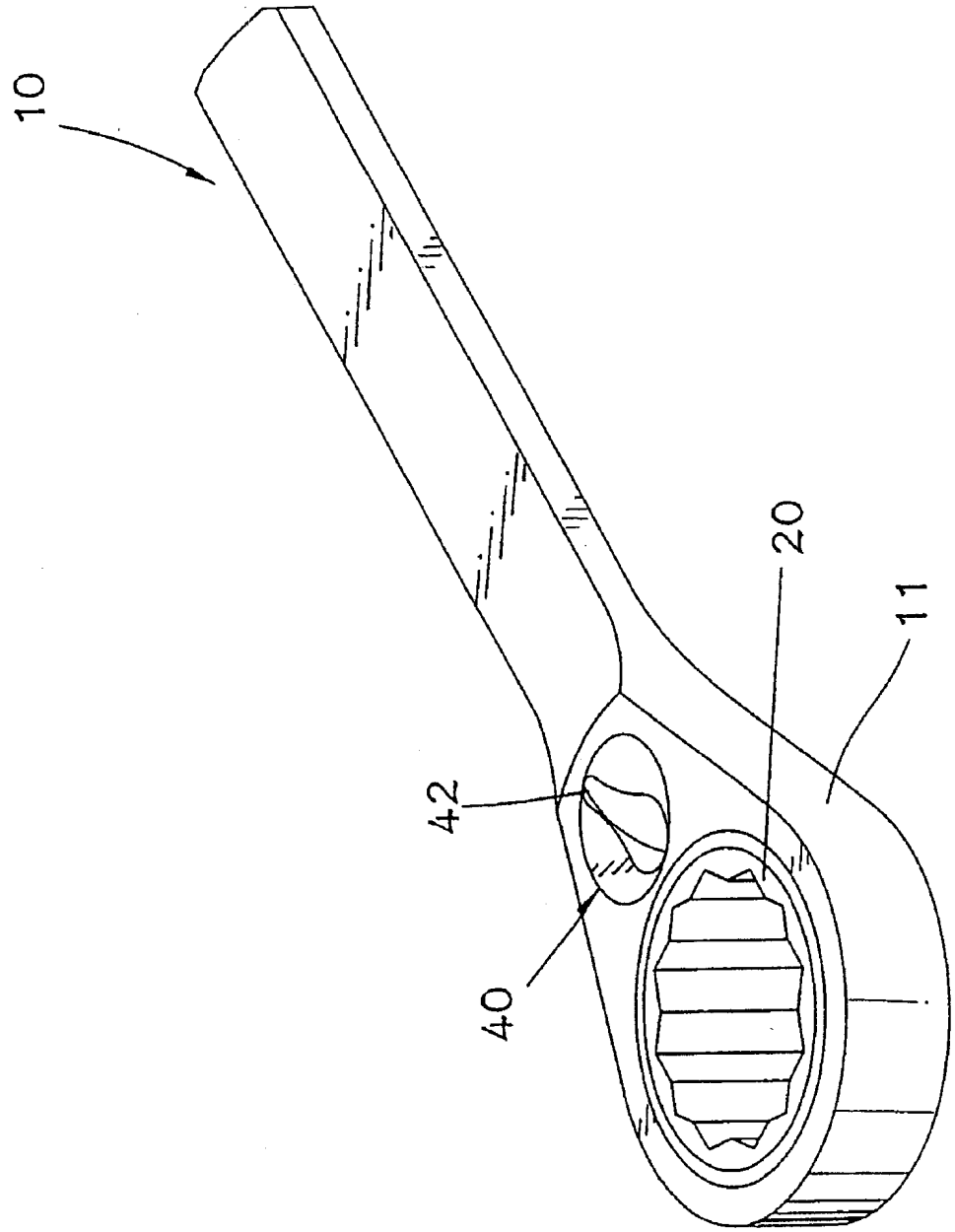


FIG. 2

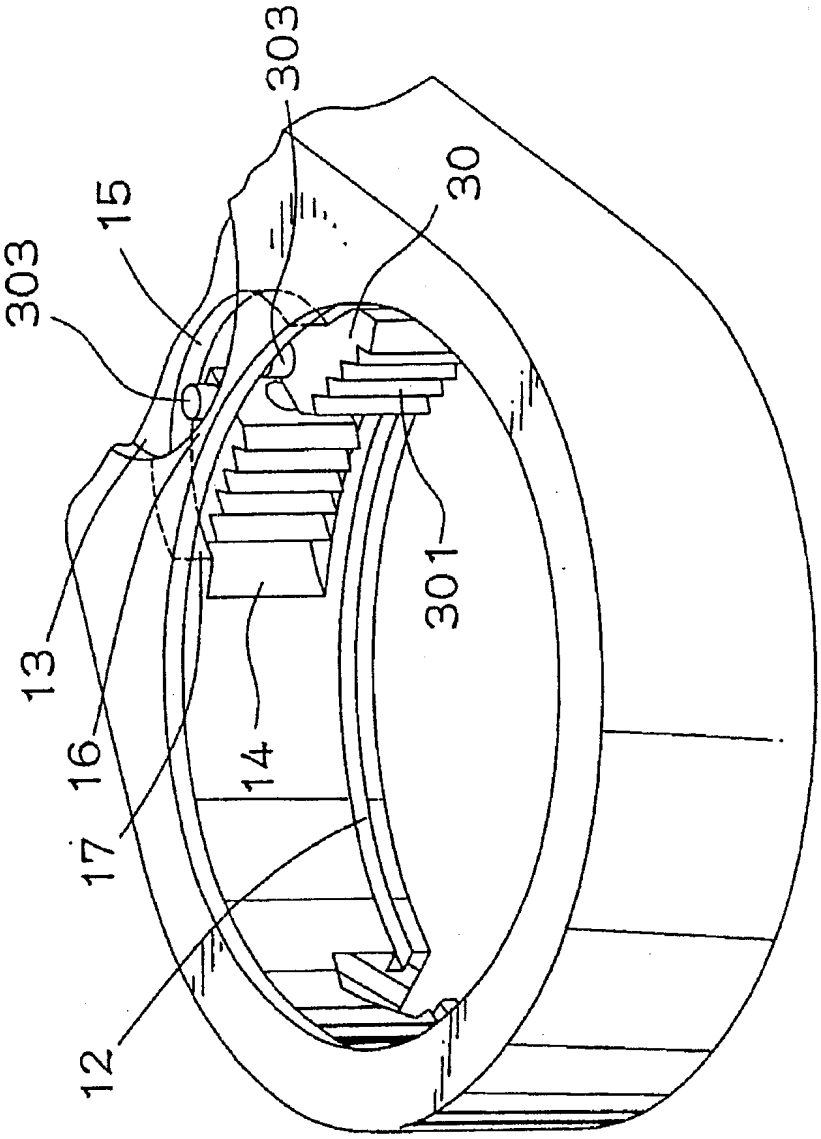


FIG. 3

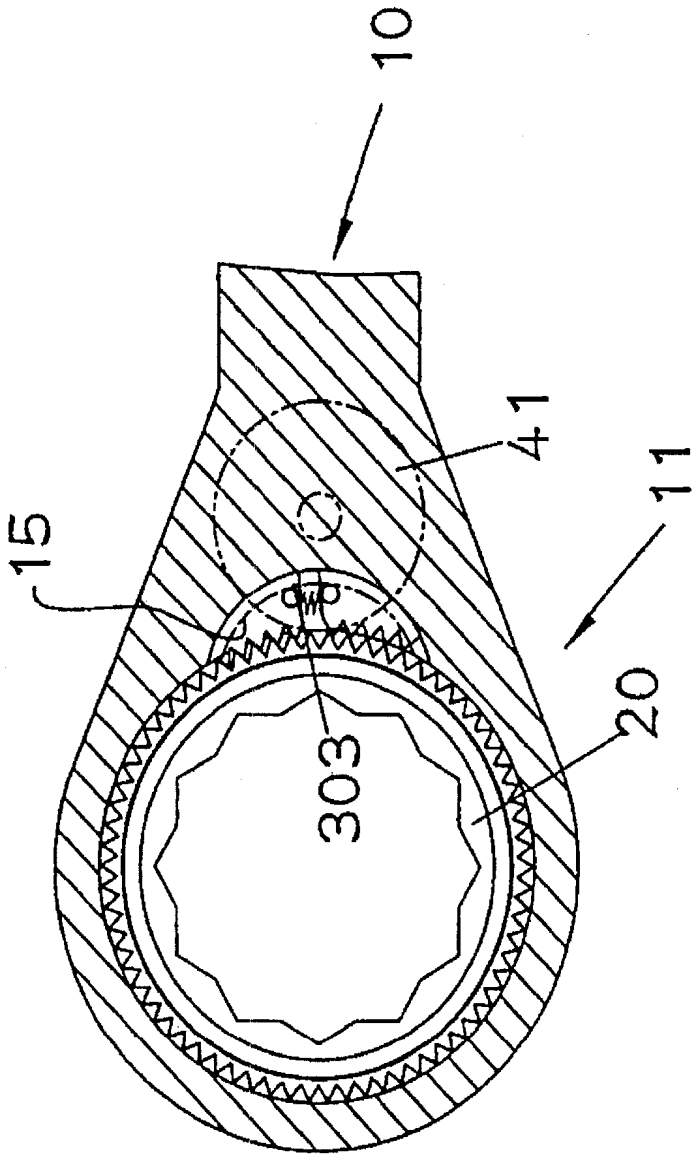


FIG. 4

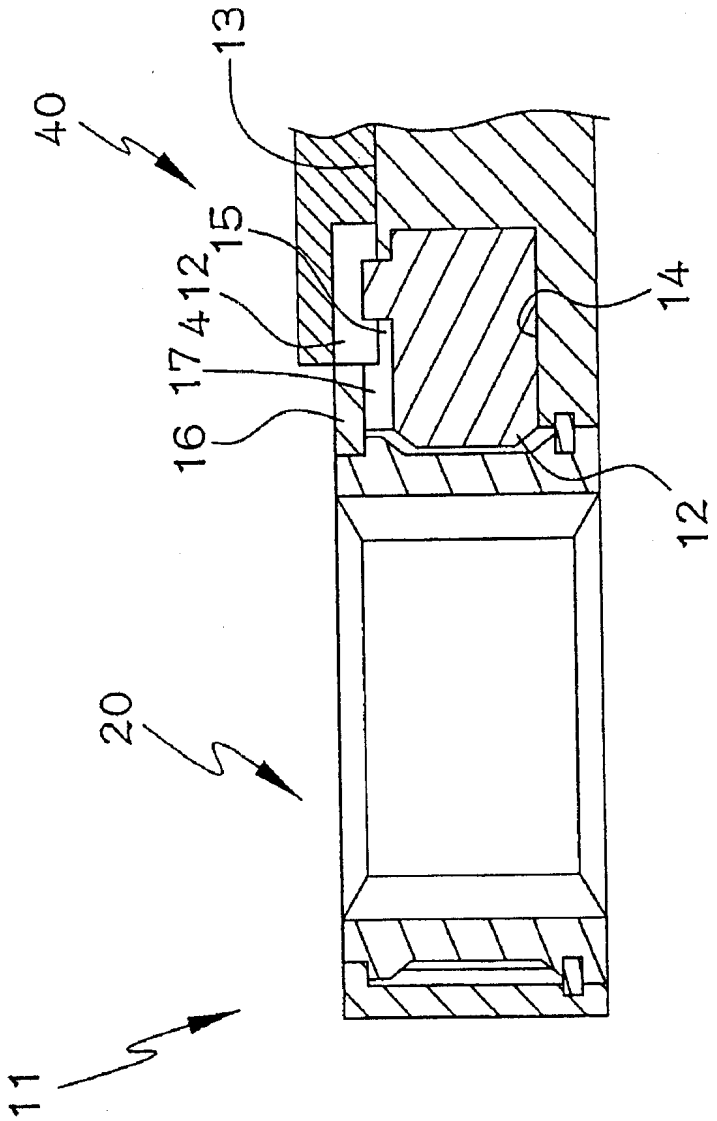


FIG. 5

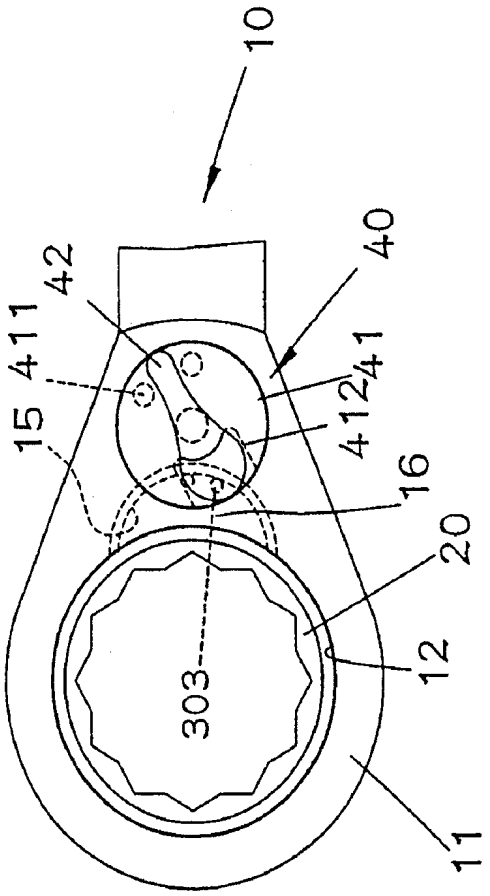
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FIG. 7

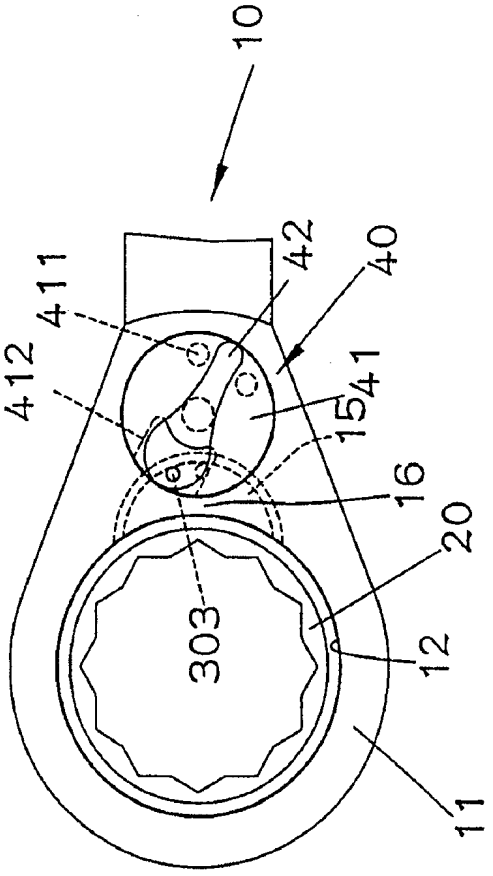
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FIG. 6

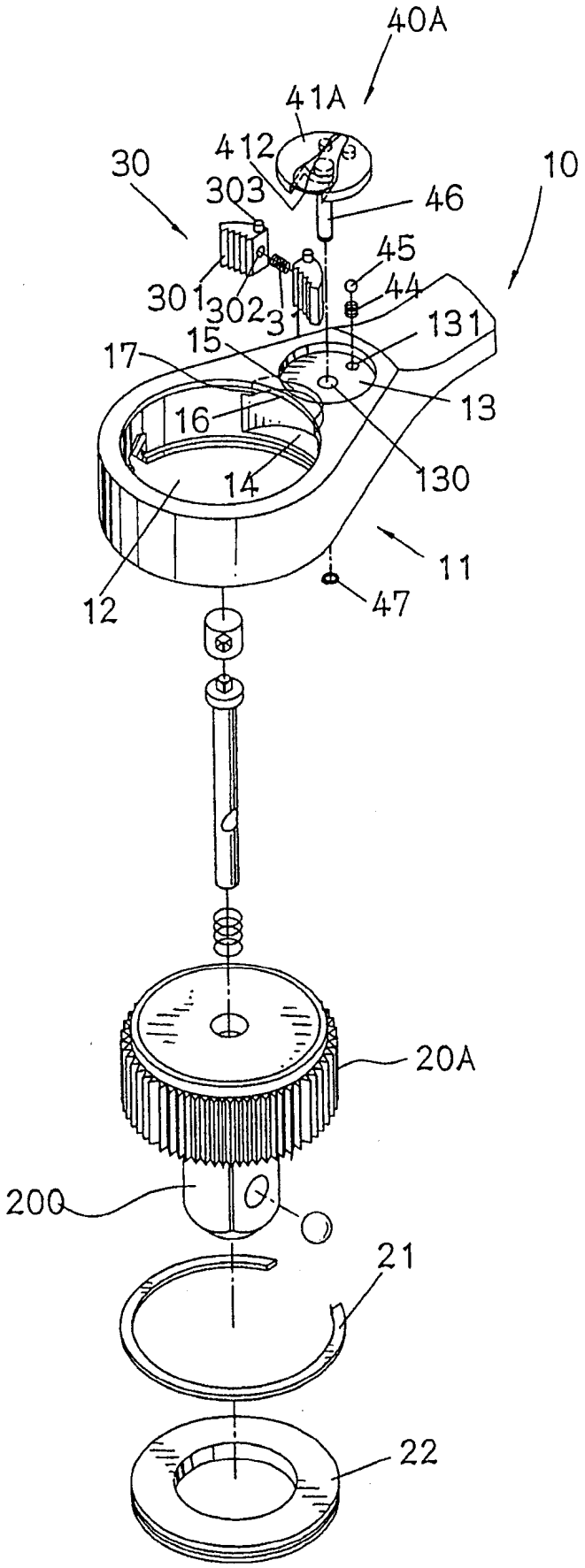
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FIG. 8

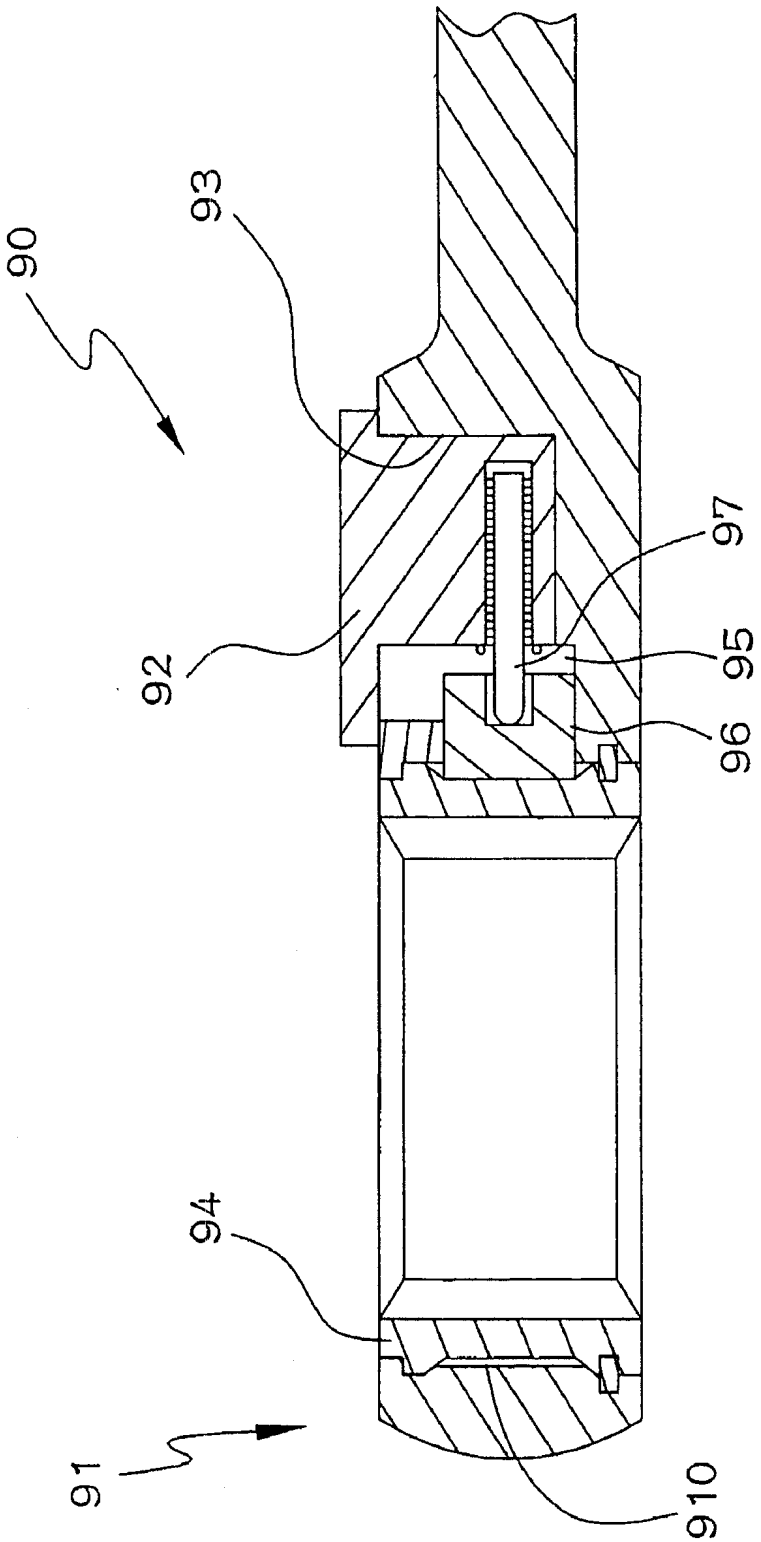


FIG. 9
PRIOR ART

# REINFORCEMENT STRUCTURE FOR WRENCH HEAD

## FIELD OF THE INVENTION

This is a Continuation-In-Part application of applicant's former patent application Ser. No. 10/428,114, filed on May 2, 2003, now U.S. Pat. No. 6,857,339.

## BACKGROUND OF THE INVENTION

Applicant's former U.S. Pat. No. 6,691,594 discloses a wrench wherein the pawls each have a protrusion on a top thereof and when installing the pawls into the recess defined in communication with the through hole in the head, the pawls have to be tilted such that the protrusions can be inserted in the recess first and then the two respective bodies of the pawls are rotated to be inserted in the recess. This spends too much assembly time. Some manufacturers break the portion between the through hole for receiving the engaging wheel and the recessed area for receiving the control member, such that the pawls can be inserted in the recess for the pawls directly without any angle adjustment. Nevertheless, the broken space weakens the structural strength of the head of the wrench.

U.S. Pat. Nos. 6,575,060 and 6,279,428 respectively disclose a wrench wherein the pawl includes a curve surface and the control member drives the center of the curve surface directly. As shown in FIG. 9 which discloses the structure of U.S. Pat. Nos. 6,282,991 and 6,282,992. The head 91 of the wrench 90 has a first hole 910 for receiving an engaging wheel 94 therein and a second hole 95 is defined between and in communication with the first hole 910 and a third hole 93 which receives a control member 92 therein. A pawl 96 is received in the second hole 95 and is engaged with the engaging wheel 94. a driving piece 97 has one end received int eh control member 92 and the other end of the driving piece 97 is engaged with a recess defined in the pawl 96. The pawl 96 is shifted left and right so that the distal end of the second hole 95 is in a broken state with the third hole 93, and the curve inside of the second hole 93 supports the pawl 96. The curve inside cannot provide sufficient support to the pawl 96.

The present invention intends to provide a wrench wherein a yield space is defined in an underside of the bridge portion located between the through hole for receiving the engaging wheel in the head and a recessed area for receiving the control member such that the protrusions of the pawls can be installed directly without any adjustment and the structural strength of the head of the wrench is reinforced.

## SUMMARY OF THE INVENTION

The present invention relates to a wrench which comprises a head having a through hole for receiving an engaging wheel and a recess for receiving two pawls is defined in an inner periphery of the through hole. A recessed area is defined in a surface of the head and a bridge portion is located between the through hole and the recessed area. A space is defined in an underside of the bridge portion and in communication with the through hole. A spring is connected between the two pawls and each pawl has a protrusion which extends into the recessed area. A control member is rotatably received in the recessed area and has a concavity in which the two protrusions are retained.

The present invention will become more obvious from the following description when taken in connection with the accompanying drawings which show, for purposes of illustration only, a preferred embodiment in accordance with the present invention.



## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view to show the wrench of the present invention;

FIG. 2 is a perspective view to show the wrench of the present invention;

FIG. 3 is a perspective view to show the two pawls received in the recess;

FIG. 4 is a top cross sectional view to show the wrench of the present invention;

FIG. 5 is a side cross sectional view to show the wrench of the present invention;

FIGS. 6 and 7 show two positions of the pawls controlled by the control member;

FIG. 8 is an exploded view to show another embodiment of the wrench of the present invention, and

FIG. 9 is a side cross sectional view to show a conventional wrench.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 to 5, the wrench 10 of the present invention comprises a head 11 having a through hole 12 defined therethrough and a recess 14 is defined in an inner periphery of the through hole 12. An engaging wheel 20 with outer teethed surface 201 is rotatably received in the through hole 12 and positioned by a C-clip 21 cooperated with a ring 22.

A recessed area 13 is defined in a surface of the head 11 and a bridge portion 16 is located between the through hole 12 and the recessed area 13. The bridge portion 16 is made to be thinner so as to have a space 17 defined in an underside of the bridge portion 16 and in communication with the through hole 12 and the recess 14. A central hole 130 is defined through the recessed area 13. Two pawls 30 are movably received in the recess 14 and a spring 31 is connected between two respective holes 302 defined in two facing ends of the two pawls 30. The two pawls 30 each have a protrusion 303 on a top thereof and the two protrusions 303 extend into the recessed area 13 via an opening 15 that is a part of the space 17 and defined through the recessed area 13. The two pawls 30 have a toothed side 301 which is alternatively engaged with the outer teethed surface 201 of the engaging wheel 20.

Further referring to FIGS. 6 and 7, a control member 40 rotatably received in the recessed area 13 and includes a disk 41 which has a positioning hole 410 so that a bolt 43 extends through the central hole 130 and the positioning hole 410. A recess 131 is defined in a top of the inside of the recessed area 13 and a bead 45 and a spring 44 are received in the recess 131. The bead 45 is engaged with one of two dents 411 defined in an underside of the disk 41 so that the user can position the disk 40 at two positions defined by the two dents 411. A concavity 412 is defined in a periphery thereof so as to retain the two protrusions 303 so that when the user shifts a lever 42 on the disk 41, the two pawls 30 are moved in the recess 14 and engaged with the engaging wheel 20.

Because of the space 17, when installing the pawls 30 into the recess 14, the pawls 30 need not to tilt and the protrusions 303 are allowed to pass through the space 17 and the pawls 30 are conveniently installed in the recess 14.

As shown in FIG. **8**, the invention can also used in a ratchet wrench that has a driving shaft **200** integrally extending from the engaging wheel **20**A. The difference from the embodiment as disclosed in FIGS. **1–5** is that the control member **40**A includes a rod **46** extending from an underside of the disk **41**A and a retaining member **47** is mounted to the rod **46** after the rod **46** extends through the central hole **130** in the recessed area **13** so as to position the control member **40**A.

While we have shown and described the embodiment in accordance with the present invention, it should be clear to those skilled in the art that further embodiments may be made without departing from the scope of the present invention.

What is claimed is:

1. A wrench (**10**) comprising:

a head (**11**) having a through hole (**12**) defined therethrough and a recess (**14**) defined in an inner periphery of the through hole (**12**), a recessed area (**13**) defined in a surface of the head (**11**) and a bridge portion (**16**) located between the through hole (**12**) and the recessed area (**13**), a space (**17**) defined in an underside of the bridge portion (**16**) and in communication with the through hole (**12**);

an engaging wheel (**20**) rotatably received in the through hole (**12**);

two pawls (**30**) and a spring (**31**) connected between the two pawls (**30**), the two pawls (**30**) movably received in the recess (**14**), each pawl (**30**) having a protrusion (**303**) which extends into the recessed area (**13**), and



a control member (**40**) rotatably received in the recessed area (**13**) and having a concavity (**412**) in which the two protrusions (**303**) are retained, the two pawls (**30**) being moved when the control member (**40**) is rotated.

2. The wrench as claimed in claim 1, wherein a central hole (**130**) is defined through the recessed area (**13**) and the control member (**40**) includes a positioning hole (**410**), a bolt (**43**) extending through the central hole (**130**) and the positioning hole (**410**).

3. The wrench as claimed in claim 1, wherein a central hole (**130**) is defined through the recessed area (**13**) and the control member (**40A**) includes a rod (**46**) extends from an underside thereof, a retaining member (**47**) mounted to the rod (**46**) so as to position the control member (**40A**).

4. A wrench comprising:

a head (**11**) having a through hole (**12**) defined therethrough and a recess (**14**) defined in an inner periphery of the through hole (**12**), a recessed area (**13**) defined in a surface of the head (**11**) and a bridge portion (**16**) located between the through hole (**12**) and the recessed area (**13**), a space (**17**) defined in an underside of the bridge portion (**16**) and in communication with the through hole (**12**), the space (**17**) allowing protrusions (**303**) on pawls (**30**) to be inserted in the recess (**14**) directly.

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## 七、指定代表圖：

(一)本案指定代表圖為：圖二。

(二)本代表圖之元件符號簡單說明：

| | | | |
|---|---|---|---|
| 10 | 本體 | 11 | 第一容置空間 |
| 111 | 環溝 | 112 | 凸緣 |
| 12 | 第二容置空間 | 13 | 第一側 |
| 14 | 第二側 | 15 | 導孔 |
| 151 | 弧長 | 152 | 徑向長度 |
| 16 | 定位裝置 | 161 | 容槽 |
| 162 | 定位件 | | |
| 20 | 棘動件 | 21 | 齒 |
| 22 | 驅動部 | 23 | 凹環 |
| 24 | C型扣 | | |
| 30 | 卡掣裝置 | 31 | 卡掣件 |
| 311 | 容部 | 312 | 導引部 |
| 313 | 齒 | 314 | 凹部 |
| 32 | 彈性體 | | |
| 40 | 換向開關 | 41 | 撥鈕 |
| 411 | 撥動部 | 412 | 腳部 |
| 4121 | 厚度 | 4122 | 長度 |
| 413 | 凹缺 | 43 | 限位件 |
| 431 | 凹缺 | 432 | 第一限位部 |
| 433 | 第二限位部 | 434 | 第三限位部 |

## 八、本案若有化學式時，請揭示最能顯示發明特徵的化學式：