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(54) Socket wrench

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Description

FIELD OF THE INVENTION

The present invention relates to a socket wrench, and particularly to a socket wrench in which, when tightening or loosening various bolts and nuts, a proper socket unit fitting to the bolt or nut can be easily selected and used by coupling or detaching upper and lower socket assemblies.

BACKGROUND OF THE PRESENT INVENTION

Korean Utility Model Publication No. 84-2675 and 83-1343 are the prior art for the present invention, and, of them, the former has the following features. That is, a plurality of socket members are provided in such a manner that they can be used for bolts and nuts of various sizes without changing the socket members. However, in this device, a proper socket member has to be selected and is let to be projecting forwardly in order to use it for a bolt or nut. Therefore, the projecting portion receives intensive stresses during the use, and therefore, when designing the tool, the projecting portion has to be given a sufficient thickness so as to have a sufficient strength, with the result that the total bulk of the tool is increased.

In the case of the latter (83-1343), socket members of different sizes are provided, and, in accordance with the need, a proper socket member has to be attached in the form of replacement. Thus a plurality of socket members have to be carried separately, and therefore, various inconveniences are accompanied, as well as there is the apprehension that the socket members might be lost.

There is also Korean Utility Model Application No. 89-13012 which has been filed by the present inventor on September 2, 1989. However, this document was only published on September 21, 1991 i.e. after the filing date of the present application. The device proposed therein gives solutions to the various problems inherent in the preceding devices, but has a disadvantage as described below. That is, when the main body is restored to the original position after turning the socket frame during the use, the main body moves in a state with the knob secured to the socket frame, with the result that there are generated frictions between the knob and the main body so that the life expectancy of the knob is adversely affected. Further, between a socket frame and an outer socket frame, there is required a separate slidably securing mechanism which consists of a combination of a ball, a spring and a headless bolt, and therefore, there can occur disorders in its operation.

The document EP-A-0 087 243 discloses an adjustable socket wrench wherein the socket is shaped to engage a nut or the like and has at least one insert which is geometrically similar to the interior work part of the socket. The inserts are sliding close fit within the socket so as to be movable to and from a position of use and so that either the socket or an insert can be used to engage a nut. Furthermore, means are provided to urge the corresponding insert towards the position of use and wherein means are provided for selectively restraining the selected number of inserts in the position of use.

SUMMARY OF THE INVENTION

The present invention is intended to overcome the above described disadvantages of the conventional devices.

Therefore it is a first object of the present invention to provide a socket wrench which is convenient to use, simple in its structure, and long in its life expectancy because an axially adjusting mechanism is not interfered even if the main body and the socket units are separately actuated.

It is a second object of the present invention to provide a socket wrench which can be used for a wide range of sizes of bolts and nuts.

These objects are achieved by a socket wrench according to claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects of the present invention will become more apparent by describing in detail preferred embodiments of the present invention with reference to the attached drawings in which:

Figure 1 is an exploded perspective view of a socket wrench;

Figure 2 is a longitudinal sectional view of the assembled state of the device of Fig. 1;

Figure 3 is a plan view of the device of Fig. 1 with the upper cover removed;

Figure 4 is a longitudinal sectional view showing another socket wrench and showing the method of fastening the lower cover;

Figure 5 illustrates a state of the socket wrench of Fig. 4 with the lower cover separated;

Figure 6 is an exploded perspective view of an embodiment of the present invention;

Figure 7 is a longitudinal sectional view of the assembled state of the embodiment of Figure 6;

Figure 8 is a sectional view taken along the line A-A of Figure 7;

Figure 9 is a plan view of the embodiment of Figure 6, with the lower socket member elimi-
DESCRIPTION OF THE PREFERRED EMBODIMENT

The socket wrench shown Figures 1 to 3 includes in a combined form: a main body 1 having a handle portion 1a at one side thereof; an upper outer socket 2 and upper socket units 3, 4 concentrically overlappingly installed in an axially slidable manner; an upper cover 6 having a guide member 5 at the bottom thereof; an axially adjusting mechanism 7 for axially adjusting the upper socket units 3, 4; and an ordinary ratchet mechanism 8; and a concentrical shaft 74, all the above parts being integrally formed.

Meanwhile, the adjusting knob 71 is provided with a projection 75 on the top thereof. Therefore, the axially adjusting mechanism 7 can be installed in such a manner that the cylindrical member 73 is rotatably inserted into the installation hole 51 of the guide member 5; the concentrical shaft 74 is rotatably inserted into the installation hole 60 of the upper cover 6; and the upper end portion of the concentrical shaft 74 is fixedly inserted into the adjusting knob 71 so that, in accordance with the turning of the adjusting knob 71, the actuation bar 70 should also be turned.

Under this condition, when the adjusting knob 71 is turned, the user knows the current position, i.e., the position of contact between the bottom of the adjusting bar 72 and the annular step 21 of the outer socket 2, and between the bottom of the adjusting bar 72 and the upper faces of the socket units 3, 4 as shown in Figure 3, because the omega shaped leaf spring 52 which is secured by being inserted into the installation slot 53 of the guide member 5 is also coupled with the retaining slots 73a by inserting the middle projection 52a of the spring 52 into the slots 73a.

The ratchet mechanism 8 includes: ratchets 80, 81 for being rotatably inserted into the ratchet installing slots 11 of the main body 1; a pressing cam 82 disposed between the ratchets 80, 81, and rotatably installed to the installation hole 64 of the upper cover 6; and an adjusting knob 83 installed to the top of the pressing
The ratchets 80, 81 are elastically installed by installation springs 84, 85 between the outer sides of the ratchets 80, 81 and the inner walls of the open slots 11. The pressing cam 82 includes a lower pressing end 86 and an upper revolution shaft 87 in an integral form, and thus, in accordance with the direction of the revolution of the pressing end 86, the pressing cam 82 presses one of the ratchets 80, 81, so that the tip of one of the ratchets 80, 81 should be meshed with the teeth portion 3 of the outer socket 2, thereby deciding the rotational direction of the outer socket 2. Meanwhile, the adjusting knob 83 is provided with a shaft hole 88 for receiving the revolution shaft 87 of the pressing cam 82.

Figures 4 and 5 illustrate a modified socket wrench, which is constituted such that: the bottom of the main body 1' is made to be open; an upper outer socket 2, upper socket units 3, 4, an axially adjusting mechanism 7 and a ratchet mechanism 8 are installed in the same form as in the socket wrench of Figs. 1-3; and a lower cover 9 is installed to the bottom of the main body 1'

Therefore, descriptions for the upper outer socket 2, the axially adjusting mechanism 7, the upper socket units 3, 4 and the ratchet mechanism 8 will be skipped, and descriptions will be focused mainly on the main body 1' and the lower cover 9.

The main body 1' includes: a handle portion 1a fixedly installed at one side thereof; an open slot 11' for receiving the outer upper socket 2 and the ratchet mechanism 8; an annular groove 17 for receiving the upper end portion of the upper outer socket 2; an installation slot 18 having a shaft hole 18a at the centre thereof and for installing the axially adjusting mechanism 7; a shaft hole 19 for rotatably installing the revolution shaft 87 of the ratchet mechanism 8; installation slots 15', 16' also for installing the ratchet mechanism 8; fastening holes 13', 14' formed at the opposite sides of the bottom thereof; a step portion 10' (elliptical step) for installing the lower cover 9; and a recess 12' formed at one side of the outer upper portion thereof in order to install the adjusting knob 83 of the ratchet mechanism 8 in a left and rightwardly movable manner.

The lower cover 9 takes an elliptical form so as to be fitted to the step portion 10' of the main body 1'. The lower cover 9 further includes: fastening holes 90, 91 for fastening the lower cover 9 to the main body 1' by means of fastening screws 92, 93; and a circular recess 94 formed at one side thereof and for receiving the upper outer socket 2 in a rotatable manner. The upper outer socket 2, the upper socket units 3, 4, the axially adjusting mechanism 7, and the ratchet mechanism 8 are installed into the main body 1' in the cited order, and then, the lower cover 9 is fitted and fastened by means of the fastening screws 92, 93.

Figures 6 to 9 illustrate an embodiment of the present invention, and in this embodiment, the main body 1', the upper socket units 3, 4, and the axially adjusting mechanism 7 are provided in the same technical constitutions as those of the socket wrench of Figures 4 and 5.

However, an upper socket assembly 5' includes an upper outer socket 2' which is slightly different from the upper outer socket 2, and an axially adjusting mechanism 7' for axially adjusting the upper socket units 3, 4. Further, a lower socket assembly 6' is provided in order to couple it with the periphery of the lower end of the upper socket assembly 5'.

Now, descriptions will be made focusing mainly on the upper and lower socket assemblies 5', 6' and the axially adjusting mechanism 7' which have features different from the socket wrenches shown in Figs. 1 - 5.

The upper socket assembly 5' consists of an upper outer socket 2' and a plurality of upper socket units 3, 4, the latter being inserted into the upper outer socket 2' in a slidable manner, and the upper outer socket 2' being also axially slidable. The upper outer socket 2' is provided with an inner teeth portion 20, and an annular step 21 for halting the upper socket unit 3. On the outside of the upper outer socket 2', there are provided upper and lower teeth portions 26, 27 and an annular groove 24 formed between the upper and lower teeth portions 26, 27, in addition to a coupling slot 25.

The upper socket units 3, 4 are inserted into the upper outer socket 2' to the hilt, while a lower cover 9' having a snap ring 28 and teeth shaped opening 9a is fitted to the annular groove 24.

The axially adjusting mechanism 7' includes: an actuation bar 72' for being fitted to one side of the lower portion of the cylindrical member 73'; a connecting shaft 74' for being secured to one side of the upper portion of the cylindrical member 73'; and an adjusting knob 71' for being secured to the connecting shaft 74'. At the centre of the top of the cylindrical member 73', there is formed a slot 76 into which a spring 77 and a securing ball 78 are inserted. The axially adjusting mechanism 7 is installed in such a manner that, in a state with the actuation bar 72', the connecting shaft 74', the spring 77 and the securing ball 78 coupled together, the connecting shaft 74' is inserted into the installation hole 18', and the adjusting knob 71' is securely fitted into the lower coupling hole 71'a from above. Thus, as the adjusting knob 71' is turned, the cylindrical portion 74' and the actuation bar 72' are moved in an interlocked state each other.

Under this condition, the adjusting knob 71' has only to be turned around the connecting shaft 74' in accordance with the position of contact between the actuation bar 72' and the annular step of the upper outer socket 2' or between the actuation bar 72' and the upper faces of the upper socket units 3, 4. That is, as shown in Figure 9, the securing ball 78 and the actuation bar 72' are turned around the connecting shaft 74' so that the ball 78 is coupled with either one of the ball securing slots 76 of the main body 1', and so that the actuation bar 72' is positioned either on the annular step 21 of the upper outer socket 2' or on the upper faces of the upper socket units 3, 4, thereby deciding the lifting of the upper
The lower socket assembly 6' includes a lower outer socket 100 which is constituted such that an elongate slot 101 is formed in the lengthwise direction; an upper teeth portion 102 is formed on the inside thereof; an intermediate portion 103 is provided for being fitted with the lower portion of the upper outer socket 2'; and a lower teeth portion 104 is also provided.

The lower teeth portion 104 is coupled with a lower socket unit 105 having a diameter different from the diameters of the inner and outer teeth portions 32, 33, 42, 43 of the upper socket units 3, 4.

The intermediate portion 103 is provided with a threaded hole 106 into which a securing ball 107, a supporting spring 108 and a headless bolt 109 are inserted and fitted.

Thus when the upper and lower socket assemblies 5', 6' are coupled together, the upper teeth portion 102 is properly fitted to and coupled with the lower teeth portion 27 of the upper outer socket 2', and the ball 107 which is elastically secured by means of the spring 108 is inserted into the coupling slot 25, thereby coupling the upper and lower socket assemblies 5', 6'.

The lower socket unit 105 is provided with an axially adjusting pin 110 at one side of the upper portion thereof, and is also provided with securing pin 111 for being fitted into the elongate slot 101, so that the lower socket unit 105 can be lifted only when the upper socket unit 3 of the upper socket assembly 5' is lifted, and that the securing pin 111 should be movable in the axial direction only within the elongate slot 101 of the lower outer socket 100.

Figures 10 to 12 illustrate another embodiment of the present invention. In comparison with the embodiment of Figures 6 to 9, the main body 1', the upper socket units 3, 4 and the lower socket unit 105 are the same in their technical constitutions, while the axially adjusting mechanism 7 has a technical constitution which is the same as that of Figures 4 and 5. However, the ratchet mechanism 8', the upper outer socket 2' of the upper socket assembly 5' and the lower outer socket 100 of the lower socket assembly 6' are uniquely different.

Therefore, descriptions will be made below focusing mainly on the ratchet mechanism 8' and on the outer sockets 2', 100.

The ratchet mechanism 8' includes: ratchets 112, 113 for being respectively fitted into coupling slots 15', 16' of the main body 1'; and a pressing cam 82 for being inserted into an installation hole 64 in a rotatable manner, and for being fixedly coupled with the adjusting knob 83.

The ratchets 112, 113 respectively include a 3-step engaging portion 114 for being meshed with the upper teeth portion 26 of the upper outer socket 2'; a spring installation slot 115; a spring hooking hole 116; and an integral pivot shaft 117. The spring installing slots 115, 116 secure the opposite ends of a tension spring 119, in such a manner that the ratchets 112, 113 should be elastically retained. The pressing cam 82 consists of an upper revolution shaft 87 and a cam shaped pressing end 86 in an integral form, and the adjusting knob 83 is provided with a shaft hole 88, so that, when coupling, the revolution shaft 87 can be rotatably inserted into the shaft hole of the adjusting knob 83.

Thus the pressing cam 82 is interlocked with the turning of the adjusting knob 83, and if the pressing end 86 pushes one of the ratchets 112, 113, then the 3-step engaging portion 114 of the ratchet which is not pushed is meshed with the upper teeth portion 26 of the upper outer socket 2', thereby deciding the rotational direction of the upper outer socket 2'.

The upper outer socket 2' of the upper socket assembly 5' includes an inner teeth portion 20, an inner annular step 21, an outer teeth portion 23, a longitudinal elongate projection 120, and a threaded hole 121, the threaded hole 121 being for receiving a securing ball 122, a supporting spring 123 and a headless bolt 124.

The lower outer socket 100' of the lower socket assembly 6' includes: an inner longitudinal groove 125 for being coupled with the longitudinal elongate projection 120; and a securing slot 126 formed at one end of the inner longitudinal groove 125 for receiving the ball 122 when coupling.

The method of the use is same both for the socket wrench of Figures 1 to 3 and that of Figures 4 and 5.

The use is carried out in such a manner that a relevant one is selected from among the upper outer socket 2 and the upper socket units 3, 4 by turning the adjusting knob 71 of the axially adjusting mechanism 7.

In this case, the adjustment is carried out in such a manner that, in the case of smallest bolts or nuts, none of the upper socket units 3, 4 is lifted; in the case of intermediate size bolts or nuts, only the upper socket unit 4 is lifted, with the upper socket unit 3 being left intact; and in the case of largest bolts or nuts, the upper socket units 3, 4 are all lifted up. The above described situations are effected in accordance with the contact position between the bottom of the longitudinal projection 72 having an elongate elliptical cross section and the upper faces of the upper socket units 3, 4, and between the bottom of the projection 72 and the annular step 21 of the outer socket 2 as shown in Figure 3. In this way, a proper socket fitting to the bolt or nut is selected, and the user can visually confirm the above mentioned contact position, because the middle projection 52a of the leaf spring 52 is inserted into the retaining slot 73a of the axially adjusting mechanism 7 in accordance with the shifting contact position upon turning the adjusting knob 71, the positions being indicated on the upper cover 6 or on the main body 1'.

In this way, after the selection of the upper outer socket 2 or one of the upper socket units 3, 4, the adjusting knob 83 of the ratchet mechanism 8', 8' is turned to left or right in accordance with the loosening or tightening of the bolt or nut, with the result that the pressing
the selection of the upper outer socket 2 and the upper socket wrench is extended. Further, upper and lower socket units 3, 4 can now be loosened or tightened.

For example, if the bolt or nut has an intermediate diameter between that of the upper socket unit 3 and the upper socket unit 4, then the lower socket unit 105 can be used. While, if the bolt or nut has a diameter larger than that of the upper outer socket 2, 2', then the lower outer socket 100 can be used.

In the case where the lower socket unit 105 is to be used, the adjusting bar 72 of the upper socket assembly (5') is let to be positioned on the upper socket units 3, 4 by turning the adjusting knob 71, so that the upper socket unit 3 can not be lifted. Then the socket unit 105 also can not be lifted owing to the function of the pin 110, and therefore, the lower socket assembly 6' of the socket wrench can be used in a state with the lower socket unit 105 fixed.

In the case where the lower outer socket 100 is to be used, the adjusting bar 72 of the actuation bar 70 is let to be positioned on the annular step 21 of the upper outer socket 2' by turning the adjusting knob 71, so that the upper socket unit 3 should be rendered liftable. In this state, if the socket unit 105 is lifted, then the pin 110 is also lifted upwardly, and the securing pin 111 is also elevated along the elongate slot 101, thereby making it possible to use the lower outer socket 100.

In this connection, for the case of the embodiment of Figures 10 to 12, the ratchets 112, 113 can maintain strong elasticities because they are provided with a compression spring 118 and a tension spring 119, while they form a firm fixing with the teeth portion 26 because they are provided with the 3-step engaging portions 114.

Thus, a socket unit which is fit to the bolt or nut to be loosened or tightened is selected in a manner described above. Then, the socket wrench of the present invention can be used like the conventional hand tools, and therefore, further descriptions on the use will be skipped.

According to the embodiments of the present invention as described above, an upper socket unit 2 and a plurality of upper socket units 3, 4 are axially slidably installed, and an axially adjusting mechanism 7 and a ratchet mechanism 8 are separately provided, so that the selection of the upper outer socket 2 and the upper socket units 3, 4 can be easily and arbitrarily carried out, and that the rotational direction of them can also easily and arbitrarily be carried out. During the use, the axially adjusting mechanism 7 is not interfering with the upper socket units 3, 4, and therefore, the life expectancy of the socket wrench is extended. Further, upper and lower socket assemblies 5', 6' can be attached or detached by simple manipulations, so that one of the outer sockets 2', 100 and the socket units 3, 4, 105 can be conveniently selected according to the need. Particularly, owing to the provisions of the compression and tension springs 118, 119 and the 3-step engaging portions 114 to the ratchets 112, 113 of the ratchet mechanism 8, the actuations become exact and smooth. Further, the overall structure of the socket wrench according to the present invention is relatively simple, and therefore, the manufacturing is rendered easy.

Claims

1. A socket wrench comprising:

- a main body (1') having a handle (1a) in an integral form, the main body (1') having an upper and a lower side;
- an upper socket assembly (5') consisting of an upper outer socket (2'), the upper outer socket (2') having an axis which extends from said lower to said upper side, and upper socket units (3, 4), the upper socket units (3, 4) being slidable along said axis;
- an axially adjusting mechanism (7) for adjusting the axial positions of the upper socket units (3, 4); and
- a ratchet mechanism (8') for setting the rotational direction of the upper outer socket (2');

characterized

a) in that the upper outer socket (2') comprises

- upper and lower teeth portions (26, 27);
- an annular groove (24) disposed between the upper and lower teeth portions (26, 27) for installing a lower cover (9) having a snap ring (28) and a teeth shaped opening (9a); and
- a coupling slot (25);

b) in that the socket wrench further comprises a lower socket assembly (6') which is to be coupled with the upper socket assembly (5'), wherein the lower socket assembly (6') comprises

- a lower outer socket (100)
- and a lower socket unit (105); the lower outer socket (100) comprising

-- an elongate slot (101) formed on a side thereof in the lengthwise direction;
-- an upper teeth portion (102) formed on the inside thereof;
-- a lower teeth portion (104); and
-- an intermediate portion (103) to be
the upper outer socket (2');

wherein the lower socket unit (105) is to be coupled with the lower outer socket (100) and has a diameter which is different from the respective diameters of the upper socket units (3, 4) and the diameter of the upper outer socket (2'), an axially adjusting pin (110) is installed on the upper side of the lower socket unit (105), and a securing pin (111) is installed on a side of the lower socket unit (105), wherein the securing pin (111) is to be coupled with the elongate slot (101) of the lower outer socket (100); and wherein the intermediate portion (103) of the lower outer socket (100) is provided with a threaded hole (106) for accommodating a ball (107), a supporting spring (108) and a headless bolt (109) so that the ball (107) can be inserted into the coupling slot (25) of the upper outer socket (2') when the upper and lower socket assemblies (5', 6') are coupled; c) in that the axially adjusting mechanism (7') comprises

- an actuation bar (72') to be secured to one side of the lower portion of a cylindrical member (73);
- a connecting shaft (74') to be secured to one side of the upper portion of the cylindrical member (73);
- an adjusting knob (71') to be secured to the connecting shaft (74'),
- a spring (77) and
- a securing ball (78),

wherein the spring (77) and the securing ball (78) are inserted into a slot (76) which is formed at the center of the upper side of the cylindrical member (73); d) and in that the ratchet mechanism (8') is for setting the rotational directions of both the upper and lower outer sockets (2', 100).

2. The socket wrench according to claim 1, wherein the upper outer socket (2') further comprises:

- a longitudinal elongate projection (120) and
- a threaded hole (121) for accommodating a securing ball (122), a supporting spring (123) and a headless bolt (124),

wherein the ratchet mechanism (8') comprises the following components:

- two 3-step engaging portions (114) for meshing with the upper teeth portion (26) of the upper outer socket (2');
- spring installation slots (115) for receiving the opposite ends of a compression spring (118); and
- spring hooking holes (116) for receiving the opposite ends of a tension spring (119);

and wherein the lower outer socket (100) comprises the following components:

- an inner longitudinal groove (125) to be coupled with the longitudinal elongate projection (120); and
- a securing slot (126) formed at a corner of the longitudinal groove (125) so that the securing ball (122) of the upper outer socket (2') can be inserted when coupling the upper and lower socket assemblies (5', 6').
oberen Stecknußbaugruppe (5') zu verbinden ist, wobei die untere Stecknußbaugruppe (6') folgendes aufweist:

- eine untere äußere Stecknuß (100)
- eine untere StecknußEinheit (105); wobei die untere äußere Stecknuß (100) folgendes aufweist:

- ein Langloch (101), das an ihrer einen Seite in der Längsrichtung ausgebildet ist;
- einen oberen Verzahnungsbereich (102), der an ihrer Innenseite ausgebildet ist;
- einen unteren Verzahnungsbereich (104); und
- einen Zwischenbereich (103), der mit der oberen äußeren Stecknuß (2') zu verbinden ist;

wobei die untere StecknußEinheit (105) mit dem unteren Verzahnungsbereich (104) der unteren äußeren Stecknuß (100) zu verbinden ist und einen Durchmesser hat, der von den jeweiligen Durchmessern der oberen StecknußEinheiten (3, 4) und dem Durchmesser der oberen äußeren Stecknuß (2') verschieden ist, wobei ferner ein Axialjustierstift (110) an der unteren Seite der unteren StecknußEinheit (105) eingesteckt ist und wobei ein Sicherungsstift (111) an einer Seite der unteren StecknußEinheit (105) eingesteckt ist; wobei der Sicherungsstift (111) mit dem Langloch (101) der unteren äußeren Stecknuß (100) zu verbinden ist; und wobei der Zwischenbereich (103) der unteren äußeren Stecknuß (100) mit einem Gewinde Loch (106) versehen ist, um eine Kugel (107), eine Stützfeder (108) und einen Gewindestift (109) mit Schaft aufzunehmen, so daß die Kugel (107) in den Verbindungsschlitze (25) der oberen äußeren Stecknuß (2') einsetzbar ist, wenn die obere und die untere Stecknußbaugruppe (5', 6') miteinander verbunden sind; c) daß der Axialjustiermechanismus (7') folgendes aufweist:

- eine Betätigungsstange (72'), die an einer Seite des unteren Bereichs eines zylindrischen Elements (73') zu befestigen ist;
- eine Verbindungsstange (74'), die an der einen Seite des oberen Bereichs des zylindrischen Elements (73') zu befestigen ist;
- einen Justierknopf (71'), der an der Verbindungsstange (74') zu befestigen ist,
- eine Feder (77) und
- eine Sicherungskugel (78);

wobei die Feder (77) und die Sicherungskugel (78) in einen Schlitze (76) eingesetzt sind, der in der Mitte der oberen Seite des zylindrischen Elements (73) ausgebildet ist; d) und daß der Sperrklinkenmechanismus (8') zum Vorgeben der Drehrichtungen sowohl der unteren als auch der oberen äußeren Stecknuß (2', 100) dient.

2. Steckschließel nach Anspruch 1, wobei die obere äußere Stecknuß (2') ferner folgendes aufweist:

- zwei 3-Stufen-Eingriffsbereiche (114) zum Eingriff mit dem oberen Verzahnungsbereich (26) der oberen äußeren Stecknuß (2');
- Federeinbauschlitze (115) zur Aufnahme der entgegengesetzten Enden einer Druckfeder (118); und
- Federeinhaklocher (116) zur Aufnahme der entgegengesetzten Enden einer Spannfeder (119);

und wobei die untere äußere Stecknuß (100) die folgenden Komponenten aufweist:

- eine innere Längsnut (125), die mit dem in Längsrichtung verlaufenden langgestreckten Vorsprung (120) in Verbindung zu bringen ist; und
- eine Arretiervertiefung (126), die an einer Ecke der Längsnut (125) ausgebildet ist, so daß die Sicherungskugel (122) der oberen äußeren Stecknuß (2') einsetzbar ist, wenn die obere und die untere Stecknußbaugruppe (5', 6') miteinander verbunden werden.

Revendications

1. Clé à douille, comprenant :

- un corps principal (1') ayant un manche (1a) d'un seul tenant, le corps principal (1') ayant un côté supérieur et un côté inférieur;
- un ensemble de douilles supérieur (5') comprenant une douille externe supérieure (2'), la douille externe supérieure (2') ayant un axe qui s'étend dudit côté inférieur audit côté supérieur, et des unités de douille supérieures (3, 4);
4), les unités de douille supérieures (3, 4) pouvant couliser selon ledit axe;

- un mécanisme de réglage axial (7') pour régler les positions axiales des unités de douille supérieures (3, 4); et

- un mécanisme de cliquets (8') pour fixer le sens de rotation de la douille extérieure supérieure (2');

caractérisée :

(a) en ce que la douille extérieure supérieure (2') comprend :

- des portions dentées supérieure et inférieure (26, 27);

- une gorge annulaire (24) disposée entre les portions dentées supérieure et inférieure (26, 27), pour installer un couvercle inférieur (9') ayant un anneau d'encliquetage (28) et une ouverture en forme de dents (9a); et

- un trou de couplage (25);

(b) en ce que la clé à douille comprend en outre un ensemble de douilles inférieur (6') qui doit être couplé avec l'ensemble de douilles supérieur (5'), l'ensemble de douilles inférieur (6') comprenant :

- une douille extérieure inférieure (100),

- et une unité de douille inférieure (105);

la douille extérieure inférieure (100) comprenant :

- une encoche allongée (101) formée sur un de ses côtés dans la direction longitudinale;

- une portion dentée supérieure (102) formée sur son intérieur;

- une portion dentée inférieure (104); et

- une portion intermédiaire (103) couplée avec la douille extérieure supérieure (2');

dans laquelle l'unité de douille inférieure (105) est prévue pour être couplée avec la portion dentée inférieure (104) de la douille extérieure inférieure (100) et a un diamètre qui est différent des diamètres respectifs des unités de douille supérieures (3, 4) et du diamètre de la douille extérieure supérieure (2'), une broche de réglage axial (110) est installée sur le côté supérieur de l'unité de douille inférieure (105) et une broche de fixation (111) est installée sur un côté de l'unité de douille inférieure (105); dans laquelle la broche de fixation (111) est prévue pour être couplée avec l'encoche allongée (101) de la douille extérieure inférieure (100); et dans laquelle la portion intermédiaire (103) de la douille extérieure inférieure (100) est prévue avec un trou taraudé (106) pour recevoir une bille (107), un ressort support (108) et un boulon sans tête (109) de telle sorte que la bille (107) peut être introduite dans l'encoche de couplage (25) de la douille extérieure supérieure (2') lorsque les ensembles de douilles, supérieur et inférieur (5', 6), sont couplés ensemble;

(c) en ce que le mécanisme de réglage axial (7') comprend :

- une barre d'actionnement (72') à fixer sur un côté de la portion inférieure d'un élément cylindrique (73);

- un arbre de liaison (74') prévu pour être fixé sur un côté de la portion supérieure de l'élément cylindrique (73);

- un bouton de réglage (71') prévu pour être fixé sur l'arbre de liaison (74),

- un ressort (77) et

- une bille de fixation (78),

dans lequel le ressort (77) et la bille de fixation (78) sont introduits dans une encoche (76) qui est formée au niveau du centre du côté supérieur de l'élément cylindrique (73);

(d) et en ce que le mécanisme de cliquets (8') est prévu pour fixer les sens de rotation à la fois des douilles extérieures supérieure et inférieure (2', 100).

2. Clé à douille selon la revendication 1, dans laquelle la douille extérieure supérieure (2') comprend :

- une saillie allongée longitudinale (120), et

- un trou taraudé (121) pour recevoir une bille de fixation (122), un ressort support (123) et un boulon sans tête (124).
dans laquelle le mécanisme de cliquets (8') comprend les composants suivants :

- deux portions de coopération à trois gradins (114) pour engrener avec la portion dentée supérieure (26) de la douille extérieure supérieure (2') ;

- des encoches d'installations de ressort (115) pour recevoir les extrémités opposées d'un ressort de compression (118) ; et

- des trous d'accrochage de ressort (116) pour recevoir les extrémités opposées d'un ressort de traction (119) ;

et dans laquelle la douille extérieure inférieure (100) comprend les composants suivants :

- une rainure longitudinale intérieure (125) prévue pour être couplée avec la saillie allongée longitudinale (120) ; et

- une encoche de fixation (126) formée au niveau d'un coin de la rainure longitudinale (125) de telle sorte que la bille de fixation (122) de la douille extérieure supérieure (2') peut y être introduite lors du couplage des ensembles de douilles, supérieur et inférieur (5', 6').
FIG. 12