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(71) Applicant: Tung, Yi-Ming
Chen, Taichung Hsien (TW)

(72) Inventor: Tung, Yi-Ming
Chen, Taichung Hsien (TW)

(74) Representative: Hale, Peter et al
Kilburn & Strode
20 Red Lion Street
London WC1R 4PJ (GB)

(54) Multi-function tool

(57) A multi-function tool includes a rod (10) with one end thereof received in a handle (20). The other end of the rod (10) has a first recess (11) defined therein for receiving a bit, a ratchet member or the like therein, the handle (20) having a second recess (21) for receiving a telescopic element (30) therein which has a magnetic element (31) disposed to a distal end thereof, a

cap element (32) removably received in the second recess (21) when the telescope element (30) is totally received in the second recess (21), a ring element (40) slidably mounted to the rod (10) and a plurality of recesses (42) defined in the ring element (40).

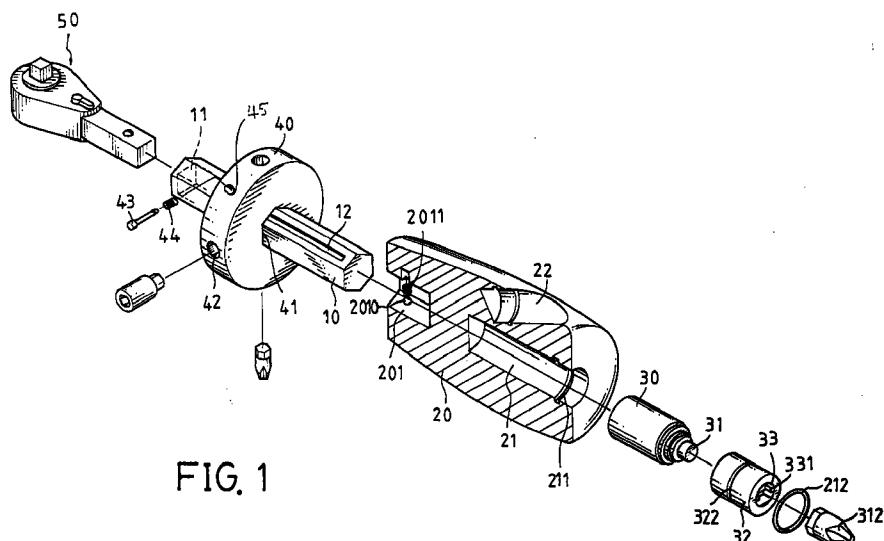


FIG. 1

Description

The present invention relates to multi-function tools.

One kind of multi-function tool has a rod and a handle receiving one end of the rod, the other end of the rod has a recess defined therein for removably receiving bits with different configurations. Accordingly, the tool can be used in many ways and situations. Such a multi-function tool generally is used by changing the bits from a distal end of the rod and the rod or the handle is seldom utilized.

The present invention intends to provide an multi-functional tool which has one end of the rod equipped with a replaceable bit and a ring element mounted to the rod so as to receive different bits in the holes defined in an outer periphery of the ring element, and a telescope element received in the handle with a magnetic part disposed to a distal end of the telescope element such that the above-mentioned problems of the conventional tool can be mitigated and/or be obviated.

The present invention is defined in the accompanying independent claims. Preferred features are recited in the dependent claims.

The present invention provides a multi-function tool which includes a rod having one end thereof received in a handle and the other end of the rod having a first recess defined longitudinally therein. The handle has a second recess defined in an end opposite to the rod and the second recess has a telescope element received therein which has a first end fixedly disposed in the second recess and a second end of the telescope element has a magnetic element disposed thereto.

A ring element has a central hole defined therein for the rod extending therethrough. The ring element has at least one third recess defined radially in an outer periphery thereof.

Preferably, the present invention provides a tool that has a ring element slidably mounted to a rod thereof and the ring element has a plurality of recesses defined in an outer periphery thereof so as to receive different bits therein.

Preferably, the present invention provides a tool which has a handle with a rod received in one end thereof and a telescope element received in a recess defined in the other end of the handle opposite to the rod.

Preferably, the present invention provides a tool which has a recess defined in the rod thereof so as to replaceably receive a bit, a ratchet element or the like therein.

In one particular form the tool may have a handle and a rod extending from the handle, a ring element slidably mounted to the rod and having a plurality of recesses defined in an outer periphery thereof for receiving bits with different configurations.

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:

5 Fig. 1 is an exploded view of a tool in accordance with the present invention;
 Fig. 2 is a side elevational view, partly in section, of the tool in accordance with the present invention;
 Fig. 3 is a side view to show a telescope element received in the handle extends out from the recess in which the telescope element is received of the handle;
 Fig. 4 is a side elevational view, partly in section, of a ratchet element which is removably received in an end of the rod;
 Fig. 5 is a side elevational view, partly in section, of the ratchet element when a pushing member is pushed downwardly; and
 Fig. 6 is an illustrative view to show a socket connected to the ring element to rotate a bolt.

Referring to the drawings and initially to Figs. 1 and 2, a multi-functional tool in accordance with the present invention generally includes a rod 10 and a handle 20. The rod 10 has one end thereof received in a receiving socket 201 defined in the handle 20. The other end of the rod 10 has a first recess 11 defined longitudinally therein for replaceably receiving a bit, a ratchet element or the like therein. A slot 12 extends longitudinally in an outer surface of the rod 10. A ball 2010 and a spring 2011 are respectively and radially received in an inner periphery defining the socket 201 so as to securely receive the of the rod 10 in the socket 201.

The handle 20 has a second recess 21 defined in an end opposite to the rod 10 and a telescope element 30. A first end of the element 30 is fixedly received in the second recess 21. The second recess 21 has a longitudinal depth which is greater than the length f the telescope element 30 when the telescope element 30 is totally received in the second recess 21. The telescope element 30 has a magnetic element 31 disposed in a second end such that the telescope element 30 can be extended out from the second recess 21 of the handle 20 by swinging or flicking the handle 20. The second recess 21 has a groove 211 defined in an inner periphery thereof in which is received a ring element 212.

A cap element 32 having an annular groove 322 extending radially therefrom is removably retained in the second recess 21 by the ring element 212 in the annular groove 322 when the telescope element 30 is totally received in the second recess 21. The cap element 32 has two ends each having a third recess 33 defined longitudinally therein for receiving a bit 312 therein when needed, where in a U-shaped urging member 331 is formed on an inner periphery of the third recess 33 so as to securely receive the bit 312. Referring to Fig. 3, the handle 20 has a fourth recess 22 defined in an outer periphery thereof so as to receive the cap element 32 therein when using the telescope element 30.

A ring element or collar 40 has a central hole 41 defined therein for the rod 10 extending therethrough. The ring element 40 has four recesses 42 defined radially in an outer periphery thereof such that different bits, adapters and the like (not shown) can be stored in the recesses 42 and the tool can be used as a torque tool or other applications by known manners. The ring element 40 has a passage 45 defined radially therein which is in communication with the central hole 41 such that a long pin 43 with a spring 44 mounted thereto is movably received in the passage 45 and a distal end of the long pin 43 is received in the slot 12 of the rod 10. Thus, the ring element 40 can be held at a position along the rod by the long pin 43 engaging with the slot 12, the spring 44 urging the long pin 43 to engage the rod 10. Referring to Fig. 6, when the ring element 40 and the rod 10 are used as a torque tool, for example, a socket piece 60 is securely received in one of the sockets 42 and a bolt 70 is received the socket piece 60 such that a user (not shown) rotating the rod 10 can rotate the ring element 40 about an axis of the socket piece 60 so as to threadedly engage a bolt 70 into an object 80.

Further referring to Figs. 4 and 5, the ratchet element comprises a body 50 and an insertion portion 52 extending from the body 50 so as to be received in the first recess 11 of the rod 10. The insertion portion 52 has a ratchet means (not shown) disposed therein in a known manner and a spring biased ball 520 received in a recess. The ball securely engaging the first recess 11 in the rod 10 when the insertion portion 52 is attached to the rod 10. The body 50 has an end portion 53. A top plate 51 is arranged on a top of the end portion 53.

The top plate 51 has a first hole 510 defined therein. A base member 54 is securely received in the body 50 and has a lower protrusion 541 extending from the open bottom. An upper recess 540 is defined in an end opposite to the protrusion 541. At least one key way 5401 is longitudinally defined in an inner periphery defining the top recess 540.

The base member 54 has a first passage 542 defined centrally therein and a first receiving chamber 543 is defined in the bottom of the top recess 540 communicating with the first passage 542 so as to form a first shoulder 544 which is part of the bottom of the first receiving chamber 543. The lower protrusion 541 has a first side hole 545 defined in a periphery thereof. A first rod 55 is movably received in the first passage 542 and the first chamber portion 543. A first head 551 is formed on an end of the first rod 55 on which is mounted a first spring 552 between the first head 551 and the first shoulder 544 such that the first head 551 is slidably received in the first receiving chamber 543. The first rod 55 has a first detent 553 defined in a periphery thereof for receiving a first ball 546 therein when the first detent 553 and the first side hole 545 are in registry with each other.

A pushing member 56 is slidably received in the body 50 and has a second protrusion 561 extending

front an end thereof which movably extends from the first hole 510. The pushing member 56 has a retaining flange 562 extending radially which limits movement of the pushing member 56 within the first hole 510. The pushing member 56 has at least one key 563 extending radially and longitudinally from the other end of the pushing member 56 so as to be slidably received in the key way 5401 of the base member 54. The second protrusion 561 has a central passage 564 and a second receiving portion 565 defined in the end opposite the second protrusion 561 and communicating with the second passage 564 so as to form a second shoulder 566 which is a part of the bottom of a second receiving chamber 565.

The second protrusion 561 has a second side hole 567 defined in its periphery. A second rod 57 is movably received in the second passage 564 and the second receiving chamber 565. A second head 571 is formed to an end of the second rod 57 on which is mounted a second spring 572 between the second head 571 and the second shoulder 566. The second head 571 contacts against the first head 551. The second rod 57 has a second detent 573 defined in a periphery thereof for receiving a second ball 568 therein when the second dimple 573 and the second side hole 567 are in registry with each other.

Each of the first protrusion 541 and the second protrusion 561 can be easily received in or removed from a respective socket (not shown) when the first/second 30 detent 553/573 and the first/second side hole 545/567 are in registry with each other and the ball 546/568 is received in the first/second detent 553/573 and the first/second side hole 545/567. The socket, as mentioned above (not shown), can be securely mounted to the first/second protrusion 541/561 when the first/second 35 detent 553/573 is shifted away from the first/second side hole 545/567. The first detent 553 and the first side hole 545 are in registry with each other when the pushing member 56 together with the second rod 57 are pushed toward the first base member 54. A distal portion of the first rod 55 extends out from the first protrusion 542 when the first detent 553 and the first side hole 40 545 are in registry with each other.

In one form of the invention provides a multi-functional tool comprising:

a rod having one end thereof received in a handle and the other end of the rod having a first recess defined longitudinally therein;
 50 the handle having a second recess defined in an end opposite to the rod, the second recess having a telescope element received therein, the telescope element having a first end fixedly disposed in the second recess and a second end of the telescope element (30) having a magnetic element disposed thereto;
 55 a ratchet element comprising a body and an insertion portion extending from the body so as to be

received in the first recess of the rod, the body having a peripheral portion, a top plate disposed to a top of the peripheral portion and an open bottom, the top plate having a first hole defined therein, a base member securely received in the body and having a first extension extending from the open bottom, a top recess defined in an end opposite to the extension and at least one key way defined in an inner periphery defining the top recess, the base member having a first passage defined centrally therein, a first receiving portion defined in a bottom of the top recess and communicating with the first passage so as to form a first shoulder which is a bottom of the first receiving portion, the first extension having a first side hole defined in a periphery thereof, a first rod movably received in the first passage and the first receiving portion, a first head formed to an end of the first rod with a first spring mounted to the first rod between the first head and the first shoulder, the first rod having a first dimple defined in a periphery thereof for receiving a first ball therein when the first dimple and the first side hole are in alignment with each other;

a pushing member slidably received in the body and having a second extension extending from an end thereof which movably extends from the first hole, the pushing member having a flange extending radially from a periphery thereof so as to limit the pushing member not to be removed from the first hole, the pushing member having at least one key extending radially from the other end of the pushing member so as to be received in the key way of the base member, the second extension having a second passage defined centrally therein, a second receiving portion defined in the end opposite to the second extension and communicating with the second passage so as to form a second shoulder which is a bottom of the second receiving portion, the second extension having a second side hole defined in a periphery thereof, a second rod movably received in the second passage and the second receiving portion, a second head formed to an end of the second rod with a second spring mounted to the second rod between the second head and the second shoulder, second head contacting against the first head, the second rod having a second dimple defined in a periphery thereof for receiving a second ball therein when the second dimple and the second side hole are in alignment with each other.

In this form the second recess may have a longitudinal depth longer than a length of the telescope element when received in the second recess.

Preferably, a cap element is removably received in the second recess when the telescope element is received in the second recess, the cap element having two ends each having a third recess defined longitudi-

nally therein.

Preferably, the handle has a fourth recess defined in an outer periphery thereof so as to receive the cap element therein.

Although the invention has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the scope of the invention as hereinafter claimed.

Claims

1. A multi-tool comprising:

a handle (20) having a handle recess;
 a rod (10) having one end engaging the handle and a longitudinally extending rod recess (11) in the other end;
 a telescopic element (30) received in the handle recess;
 a magnetic element (31) mounted on the telescopic element; and
 a collar (40) on the rod which has at least one radially extending further recess (42) defined in its outer periphery.

2. A tool as claimed in claim 1, wherein the handle recess (21) has a longitudinal depth which is greater than the collapsed length of the telescope element (30) in the handle recess (21).

3. A tool as claimed in claim 2, wherein a cap element (32) is removably received in the handle recess (21) when the telescopic element (30) is received in the handle recess (21), the cap element (32) having two ends each having a longitudinally extending cap recess (33) defined therein.

4. A tool as claimed in claim 3, wherein the handle (2) has a side recess (22) defined in an outer periphery thereof which is adapted to receive the cap element (32) therein.

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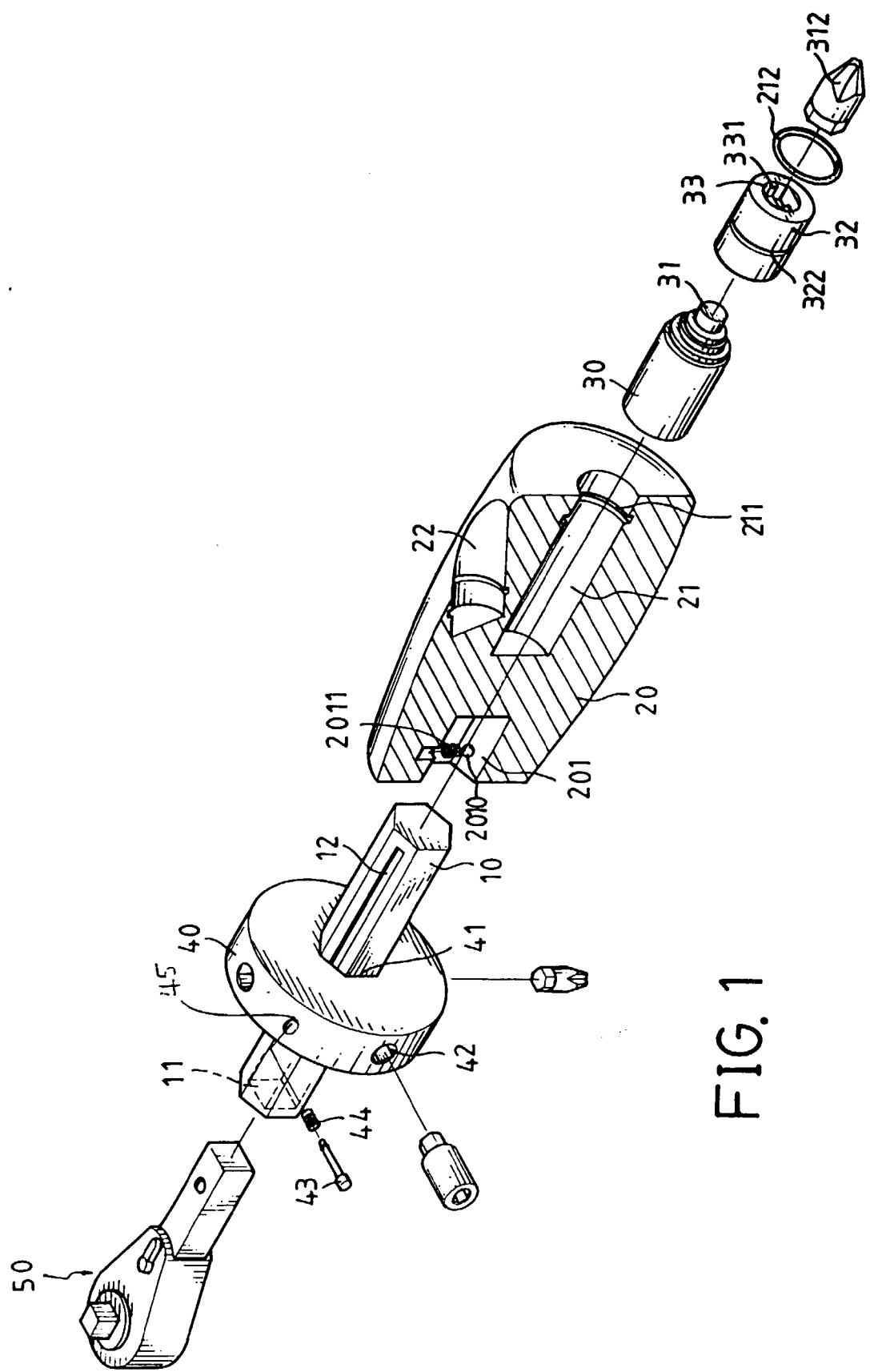


FIG. 1

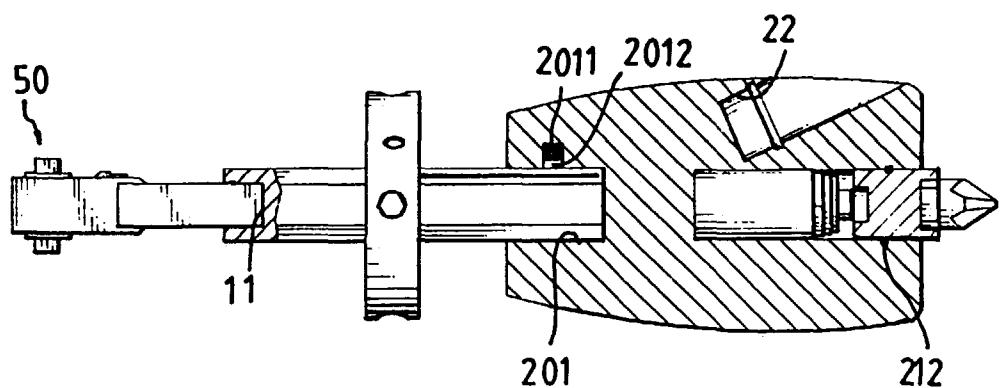


FIG. 2

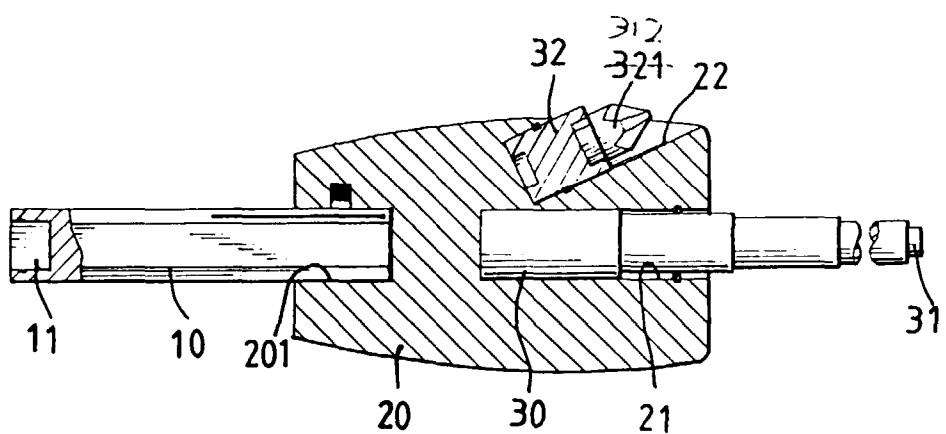


FIG. 3

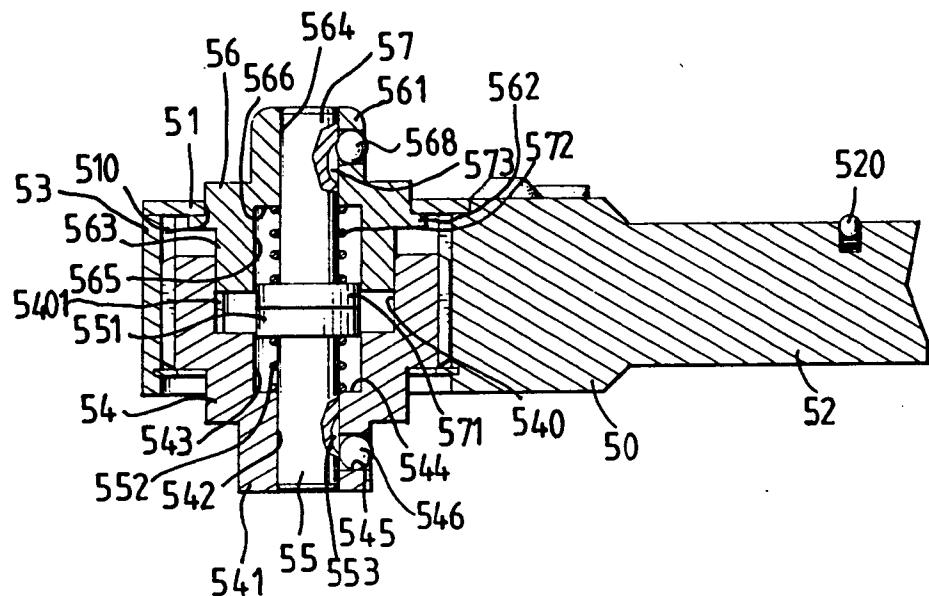


FIG. 4

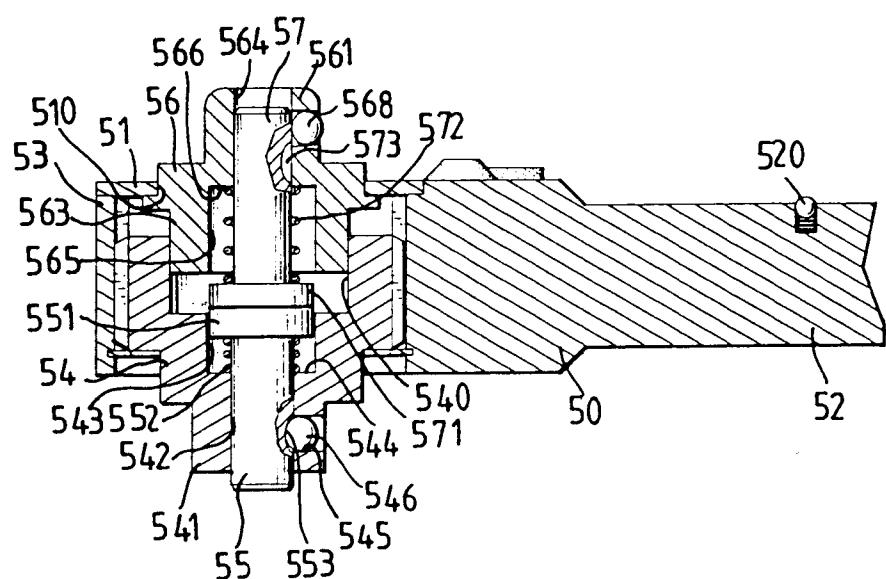


FIG. 5

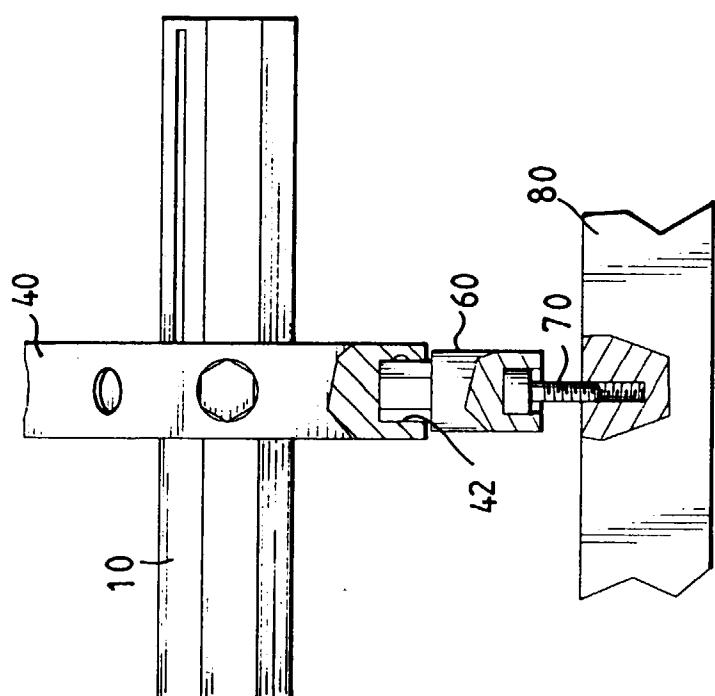


FIG. 6



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	US 5 086 674 A (HER JERN-SHONG) 11 February 1992 * the whole document * ---	1	B25F1/02 B25G1/08 B25G1/04 B25B9/00 B25B11/00
A	US 4 105 239 A (AKCZINSKI SR JOSEPH J) 8 August 1978 * abstract; figures 1-4 * ---	1	
A	FR 1 363 318 A (BUFFARD ET AL) * the whole document * ---	1	
A	US 5 381 319 A (SHIAO HSUAN-SEN) 10 January 1995 * abstract; figure 4 * ---	1	
A	US 5 245 721 A (LOWE JOSEPH T ET AL) 21 September 1993 * column 7, line 38-50; figure 1 * ---	3	
A	US 4 960 016 A (SEALS ROBERT L) 2 October 1990 ---		TECHNICAL FIELDS SEARCHED (Int.Cl.)
A	US 4 774 736 A (BRAWNER WILLIAM H ET AL) 4 October 1988 ---		
A	DE 295 01 865 U (HUANG CHEN NIU) 16 March 1995 -----		B25F B25G B25B
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	8 April 1997	M. Petersson	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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