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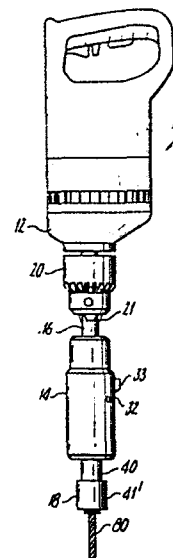
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Power tool adapter assembly.

An adapter and adapter assembly for a torquing tool includes a reversible adapter and a sleeve having an adjustable extension member. The adjustable extension member joins the sleeve to the power unit and accommodates a range of drill bit lengths when the adapter is in a fastener driver mode. The adapter is reversible within the sleeve and includes an elongated body having a bore at one end to accommodate a working member such as a drill bit and a bore at the other end to accommodate a fastener driver. The adapter body includes an internally tapped bore threadably accommodating a set screw against which the driver abuts. This provides a depth adjustment for the driver. Grooves are provided for detachable connection to the sleeve. A quick release means housed within the adapter detachably retains the working member within the bore and to the elongated body and means associated with said bore and said working member for transmitting torque from the tool to the working member. The preferred quick release means is a spring loaded shuttle positioned in an opening radially through the body member and in communication with the bore. The preferred torque transmitting means is a pair of corresponding, opposed surfaces disposed on the bore and working member respectively.

Fig.1.



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POWER TOOL ADAPTER ASSEMBLY
FIELD OF THE INVENTION

My invention relates to adapters for drilling and torquing tools and more particularly, a reversible adapter and adapter assembly for use with a standard power unit for drilling a hole and thereafter for torquing a fastener into the hole just drilled.

DESCRIPTION OF THE PRIOR ART

There are many applications which require a power drill to form a hole in a workpiece and a power installation tool to set a fastener in the predrilled hole. It is already known to use a single power unit and provide a number of interchangeable bits to perform the drilling function and the torquing function. Combination drilling and wrenching tools are also known as exemplified by U.S. Patent No. 3,965,510.

Applications such as applying threaded anchors or other types of fasteners in concrete and other masonry materials require such combination tools. However, because of the inherent difficulty of drilling and torquing in concrete and the like, complex tooling only adds to the installation problems. A number of adapters have been employed but they are either cumbersome to use or employ spring loaded or other delicate mechanisms which are not durable in applications such as concrete.

Many construction jobs require a number of different length drill bits and, therefore, there is a need for a single tool of the reversible adapter type which can accommodate these various length bits.

In many applications the worker is on scaffolding or ladders or in some other location where it is not convenient to loosen the set screw and change the drill bit or fastener driver. This is particularly a problem with respect to the drill bit since drill bit life is unpredictable both as to standard wear and to accidental breakage.

Quick release mechanisms for drills are already known for use with standard tooling. However, these quick release mechanisms are in the form of spring loaded chucks with ball retainers which are external of the elongated sleeve of the power unit. In addition, these quick release chucks accommodate only large drills. Presently quick release means are not available for adapters used in combination drilling and torquing tools.

The drill bit must often be changed while it is still hot from use. It is difficult for the user to grasp the main housing and use the quick release

mechanism to change the drill bit while the drill bit is too hot to handle. The adapter, because of its smaller size, is easier to grasp, therefore, if the portion of the adapter that includes the quick release mechanism is external of the main housing the user can grasp the adapter rather than the drill bit while changing a hot drill bit. In addition, the size and weight of the tool may be reduced by shortening the main housing so that the quick release mechanism is not located within the housing. Thus, because such a quick release mechanism would not be restrained by the main housing, an alternative means must be used to transmit the torque from the holder to the drill bit.

SUMMARY OF THE INVENTION

I have provided an adapter and an adapter assembly which are durable and provide for ease of installation. Both the drilling bit and the torquing driver remain a part of the adapter which is reversible so as to perform either function. The fastener driver includes an internal depth adjustment so that proper engagement with a variety of fastener heads can be assured. I also provide a sleeve as part of my assembly housing an adjustable extension member so that the adapter is easily attached to the sleeve to permit workers to install threaded anchors and fasteners in concrete from a substantially upright position. The adapter will accommodate drill bits and house them regardless of their length when the adapter is in the fastener driving mode. Further, I provide a quick release mechanism that is compact and contained internal of the adapter. My quick release mechanism provides for rapid and easy changing of drill bits and the like and requires no additional tooling such as screw drivers or allen wrenches to accomplish the tool change.

My reversible torquing and drilling adapter comprises an elongated body member having a bore at one end to accommodate a drill bit and a bore at the opposite end to accommodate a fastener driver. The adapter is externally symmetrical and self-contained so that either end is readily attachable to the power unit or an elongated sleeve which attaches to the power unit. An internal depth adjustment permits the fastener driver to be axially adjusted. The adapter includes an annular groove spaced inward from each of the ends of the cylindrical body and a quick release mechanism which is housed in the central portion of the body. The grooves provide the means to connect the adapter to the tool or the sleeve. The internal adjustment

is provided by a set screw threadably engaged with an internal threaded section and against which the driver abuts in end to end relationship.

An elongated sleeve including an adjustable extension member is provided in one embodiment for joining the adapter to the power unit and for accommodating the drill bit when the adapter is in a fastener driving mode. The extension member is adjustable so as to accommodate the different length drill bits. The extension member is retained in the elongated sleeve by a set screw extending radially through an opening in the sleeve. The extension member may have a circular, hexagonal or some other configuration which can be held by the set screw.

Quick release means, located within the body member of the adapter, detachably retains the drill bit or fastener driver within the bore and to the elongated body. A preferred quick release means includes a spring loaded shuttle positioned in an opening extending radially through the body member with the shuttle being movable between a first position locking the working member in the bore and a second position for releasing the working member. In the preferred embodiment the quick release means is not restrained by an outer housing such as an extension member. Therefore, means associated with the bore and the drill bit or fastener driver enables torque to be transmitted from the tool to the drill bit or fastener driver. A preferred torque transmitting means is a pair of corresponding, opposed surfaces disposed internal of the adapter and on the drill bit or fastener driver, respectively.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front elevation of a power tool showing the power unit, elongated sleeve, sleeve extension member and adapter;

Fig. 2 is a front elevation of an alternative tool showing the power unit, elongated sleeve, housing and adapter;

Fig. 3 is a front elevation, partly in section, of the tool illustrated in Fig. 1 showing the sleeve, extension member and adapter;

Fig. 4 is a section taken along sections IV-IV of Fig. 3;

Fig. 5 is a front elevation, partly in section, similar to Fig. 3 except the extension member is in its extended position and is of a different cross section;

Fig. 6 is a section taken along section lines VI-VI of Fig. 5;

Fig. 7 is a side elevation of my sleeve and adapter;

Fig. 8 is a section taken through the transverse center line of the adapter body;

Fig. 9 is a section taken along section lines IX-IX of Fig. 3 and including a drill bit;

Fig. 10 is a front elevation of a drill bit adapted for use with my invention;

Fig. 11 is a section taken along section lines XI-XI of Fig. 10; and

Fig. 12 is a section taken along section lines XII-XII of Fig. 10.

10 DESCRIPTION OF THE PREFERRED EMBODIMENTS

The tool, generally designated 10, comprises a power unit 12, an elongated sleeve 14 attached to power unit 12 by sleeve extension member 16, and reversible adapter 18 attached to the lower end of sleeve 14, Fig. 1. Sleeve 14, sleeve extension member 16 and adapter 18 are caused to rotate
15 by power unit 12. Adapter 18 accommodates drill bit 80 at one end and a fastener driver 90 at the other end, Figs. 3 and 8.

In an alternate embodiment, shown in Fig. 2, the tool 10' includes power unit 12', an elongated sleeve 15 attached to power unit 12', housing 17 attached to the lower end of sleeve 15, and adapter 18 attached to the
20 lower end of housing 17. Sleeve 15, housing 17 and adapter 18 are all adapted to rotate with power unit 12'.

Power unit 12 includes a standard chuck 20 with retractable jaws 21 to retain extension member 16 of sleeve 14. Extension member 16 is tubular having a central bore 22 extending longitudinally thereof and terminating in
25 a chamfer 23 internal of the sleeve 14. Extension member 16 is retained in sleeve 14 by means of set screw 24 which threadably engages tap 25 extending radially through the sleeve 14 into the sleeve's central opening 26. As shown in Fig. 4, extension member 16 is in its retracted position to accommodate a short drill yet still permit engagement by the chuck 20 so as
30 to retain the sleeve 14 to the power unit 12.

The extension member 16 of Fig. 5 is shown in its fully extended position in which central bore 22 accommodates long drill bit 80'. Extension member 14 is adjustable between the retracted and extended positions by merely loosening the set screw 24 and manually sliding the extension member
35 14 to the desired length to accommodate the particular drill in the adapter when the adapter is in its fastener driver mode.

Extension member 14 may have a circular cross section 27 as shown in Fig. 4 or a hexagonal cross section 28 as shown in Fig. 6. In the latter case set screw 24 will contact a flat surface.

5 Slots 31 extend vertically through the sleeve 14 at the lower end thereof, Figs. 3 and 7. Attached within the slots 31 by means of a pin 32 is a latch member 33. Latch member 33 terminates in a handle 34 at one end and in an inwardly extending finger 35 at the other end. Coil spring 36 is attached to sleeve 14 and is housed within groove 37 of handle 34 so as to urge the finger end 35 into a closed or converging position.

10 In operation, handle 34 of latch member 33 is depressed and either end of adapter 18 is inserted into sleeve 14 until finger 35 engages into external groove 43 of body member 40. Adapter 18 is inserted into sleeve 14 so that the adapter 18 rotates with sleeve 14 during operation. After a hole is drilled in concrete or the like, handle 34 is depressed and adapter 18
15 is removed and reversed so that the torquing end of the adapter 18 extends outward from the sleeve 14 so the threaded anchor can be properly set. In this position, the drill bit is safely out of the way within the internal bore of the sleeve 14.

In the alternate embodiment, the same latch mechanism is located at
20 the distal end of housing 17, Fig. 2.

The adapter 18 comprises an elongated cylindrical body 40 having an enlarged cylindrical section 41 inward of one end and an enlarged cylindrical section 41' inward of the other end, Fig. 7. Each enlarged section defines a shoulder 43 against which finger 35 of latch member 33 engages so as to
25 retain the adapter 18 in the sleeve extension 14.

Body 40 includes an inwardly extending bore 44 at one end, and an inwardly extending bore 45 and counterbore 45' at the other end. Tap hole 47 is radially directed through the body 40 into bore 44 and tap hole 47' is radially directed through the body 40 into the bore 45. Bore 45 terminates
30 in an internally tapped section 48. A clear through central opening 49 extends through the body and houses a quick release mechanism 50 to be described hereinafter.

A driver 70 fits within the bore 45, Fig. 8. Driver 70 includes a section formed of a hex wall 71 and terminates in a fastener engaging
35 member 72. An internal allen head set screw 73 engages the internal tap 48. Driver 70 abuts set screw 73 in end to end relationship and therefore set

screw 73 provides a depth adjustment for the driver 70. A set screw 74 threads into tap 47 and engages one of the faces of the hex wall 71 to retain the driver 70 in place.

To adjust the depth of the driver 70, set screw 74 is loosened and the driver 70 is removed from the body 40. Thereafter, set screw 73 is advanced
5 or retreated by means of an allen head wrench inserted in bore 45. Thereafter, driver 70 is inserted back into bore 45 and in abutting end to end relationship with set screw 73. Set screw 74 is then tightened to retain driver 70 in place. It will be recognized that driver 70 may terminate in a
10 wrenching member such as a socket as well as the driver type illustrated.

A bore 44 extends in the opposite end of the adapter 18 from bore 45 to accommodate a drill bit 80. The lower portion 44' of bore 44 has a D-shaped cross section. Thus, adapter 18 includes flat surface 46. Washer 59 is disposed along drill bit 80 so that it abuts the lower surface 42 of
15 adapter 18.

The drill bit 80 includes a flattened shank 81 of hemispherical cross section spaced between flattened shank 82 and the end section 83, Figs. 9 and 10. Flattened shank 82 having a D-shaped cross section corresponding to that of portion 44' of bore 44 in adapter 18 is spaced between drilling portion 84
20 and flattened shank 81, Figs. 10 and 12. Flattened shank 82 includes flat surface 85 and shoulder 86 formed between surface 85 and drilling portion 84.

The quick release mechanism is housed within an opening 49 extending radially through the adapter 18 and into the bore 44, Figs. 8 and 9. The major component of the quick release mechanism is the shuttle 50,
25 Fig. 9. Shuttle 50 includes an enlarged central section 53 which is dimensioned for sliding engagement within opening 49 of adapter 18. A lug 51 extends outwardly from central section 53 at one end and a reduced end section 55 including an axial threaded bore 56 extends outwardly from the other end. A retaining slot 52 is located along a portion of the central
30 enlarged section 53. A central opening 54 extends through the central section 53 and in communication with bore 56.

The positioning of the shuttle 50 in the adapter 18 is best seen in Fig. 9. A set screw 58 extends through adapter 18 and terminates in slot 52 of shuttle 50 so as to retain shuttle 50 within opening 49. Lug 51 extends out
35 of opening 49 in adapter 18, Fig. 9. Shuttle 50 is spring loaded by means of coil spring 62 housed between shoulder 57 of shuttle 50 and shoulder 60

formed within the opening 54 and internal of the adapter 18. An appropriately tipped set screw 61 threadably engages tap 56 in the reduced end section 55 of shuttle 50 so as to extend into the clear through opening 54. Set screw 61 permits adjustment of the shuttle 50 within the adapter 18.

5 In operation, lug 51 is depressed inward causing compaction of coil spring 62. The drill 80 is positioned in the drill bore 44 past opening 54 of the shuttle 50 so that surface 85 of drill bit contacts surface 46 of adapter 18 and shoulder 86 of drill bit 80 contacts the lower outer surface 42 of adapter 40. Shuttle 50 is then released causing the set screw 61 to contact
10 drill bit 80 along the flattened shank 81. The contact between the set screw 61 and the flattened surface 81 of the drill 80 causes the drill 80 to be retained within the adapter 18. The contact between surfaces 42 and 43 of adapter 18 and surfaces 85 and 86 of the drill 80 causes torque to be transmitted from adapter 18 to drill 80. Thus, drill 80 will rotate with
15 adapter 18. To release the drill 80, lug 51 is depressed, permitting drill 80 to be easily removed and replaced.

 Such a quick release mechanism could also be employed at the fastener driver end of the adapter. However, it is more practical at the drill bit end because of the more unexpected and greater need to change the drill
20 bit.

 It is to be understood that the present invention is not limited to the particular structure shown in the drawings, but also includes any modification within the scope of the appended claims.

I CLAIM:

1. A reversible drilling and torquing adapter for a tool comprising an elongated body member having a bore at one end to accommodate a drill bit, a bore at the opposite end to accommodate a fastener driver and coupling means for detachably attaching the body member to the torquing tool with either said first or second end extending from said tool, said adapter being detachable and reversible with respect to said tool.

2. The adapter of Claim 1 including adjustable depth means associated with said fastener driver end to permit axial adjustment of said driver.

3. The adapter of Claim 1 further comprising quick release means internal of the body member to detachably retain the working member within the bore and to the elongated body.

4. The adapter of Claim 3, said body member including an opening radially therethrough and in communication with said bore, said quick release means comprising a shuttle positioned in said opening and movable between a first position locking said working member in the bore and a second position for releasing said working member.

5. The adapter of Claim 3 in which said quick release means is internal of the body member and external of the tool to detachably retain the working member within the bore and to the elongated body and said improvement further comprises means associated with said bore and said working member for transmitting the torque from the tool to the working member.

6. The adapter of Claim 5, said torque transmitting means being a pair of corresponding, opposed surfaces disposed internal of said adapter and on said working member, respectively.

7. The adapter of Claim 5, said bore and said working member including corresponding portions having a D-shaped cross section so that said adapter has an internal surface corresponding to an outer surface of said

5 working member with portions of said surfaces being flat, said working member, in addition, having a shoulder formed between said flat surface and its working portion that abuts the lower outer surface of said adapter when said working member is inserted within said bore of said adapter so that said flat surfaces are in contact with each other and torque may be transmitted from said adapter to said working member.

8. In a power torquing tool comprising a power unit and a housing containing a reversible drilling and torquing adapter having a changeable drill bit at one end and a fastener driver at an opposite end, said housing connected to the power unit, the improvement comprising an adjustable extension means for joining the housing to the power unit and for accommodating the drill bit when the adapter is in a fastener driving mode.

9. The improvement of Claim 8, said extension means comprising a hollow tubing insertable at one end into a chuck of the power unit and insertable at an opposite end into a housing end opening and a set screw extending radially through said housing to said opening to engage said tubing and permit extensible adjustment thereof.

Fig.1.

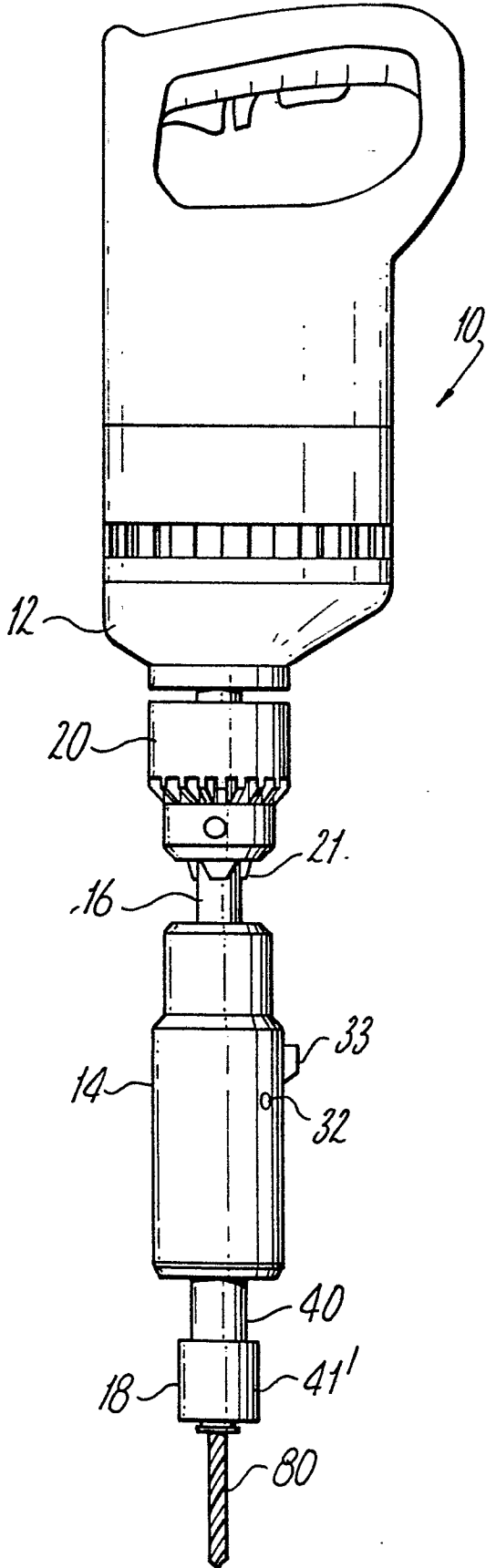


Fig.2.

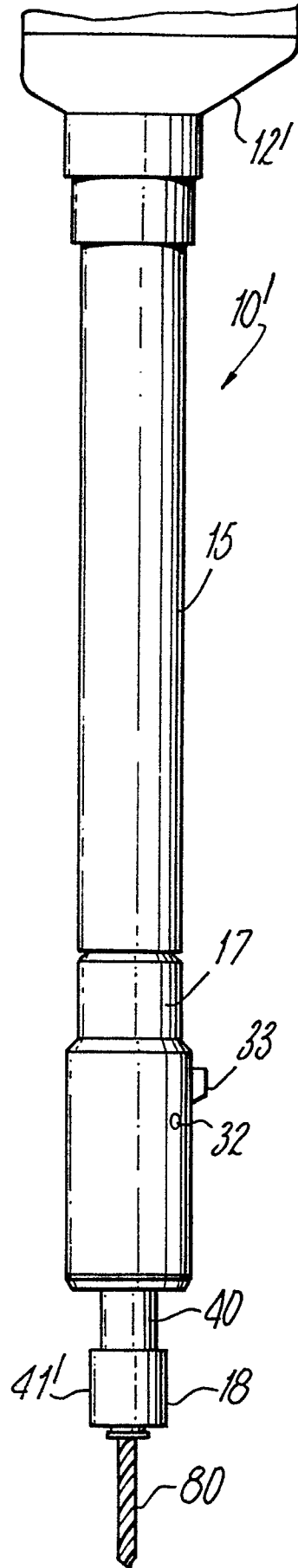


Fig.3.

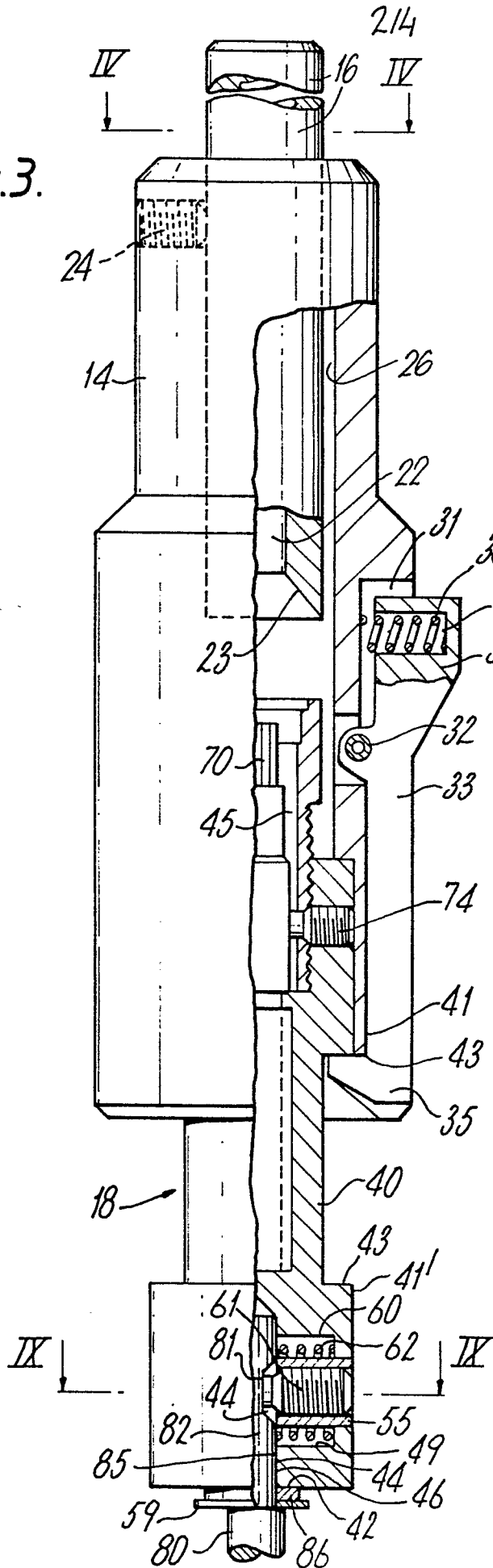


Fig.4.

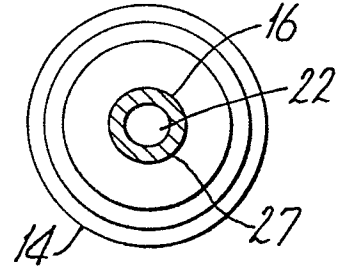


Fig.7.

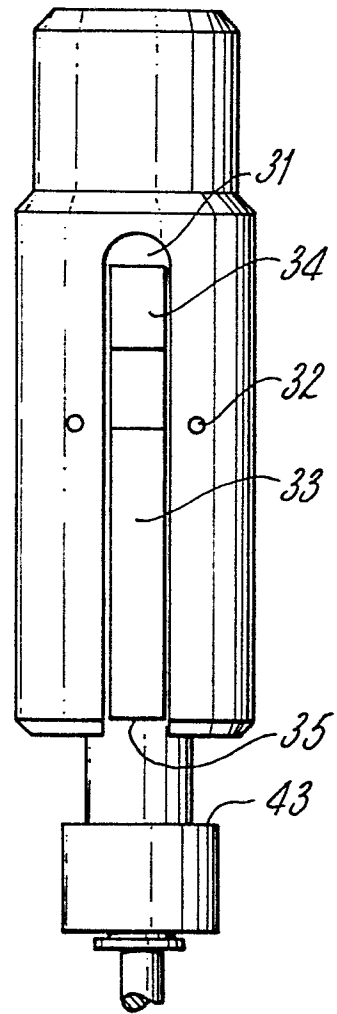


Fig. 5.

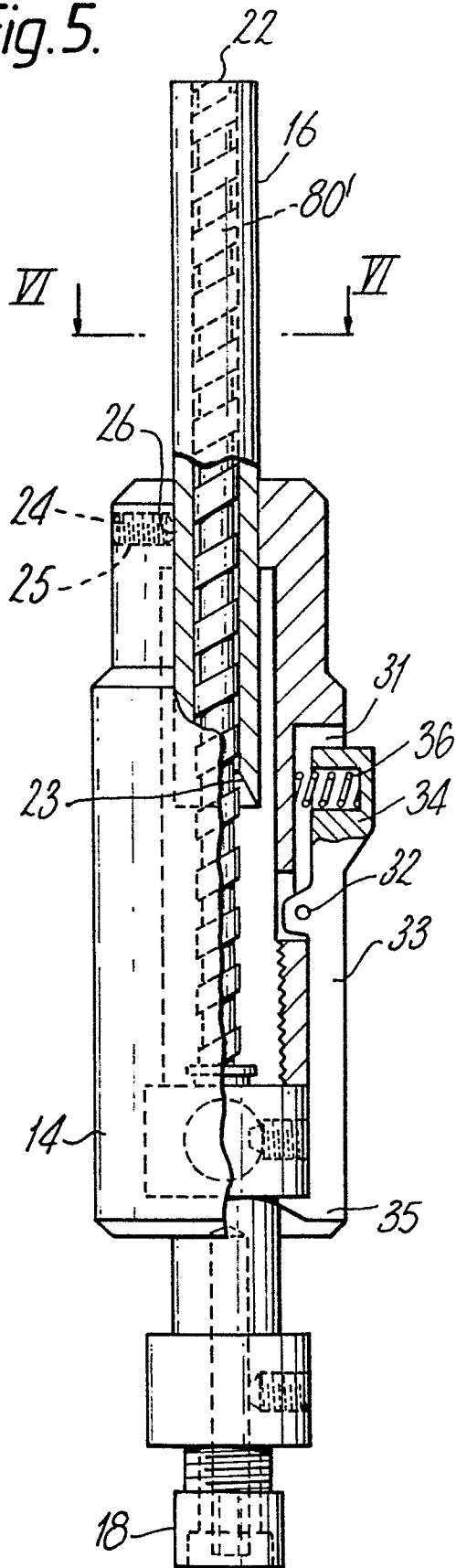
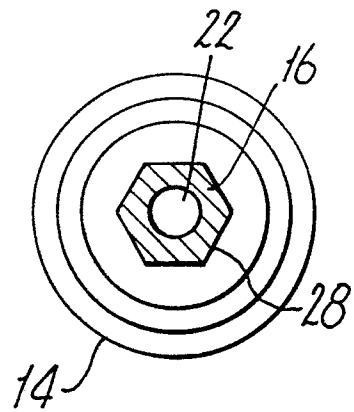


Fig. 6.



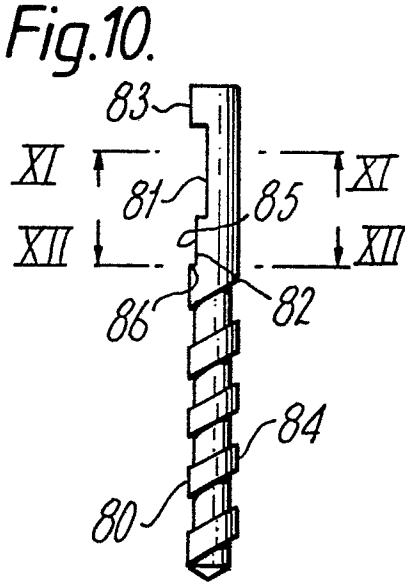
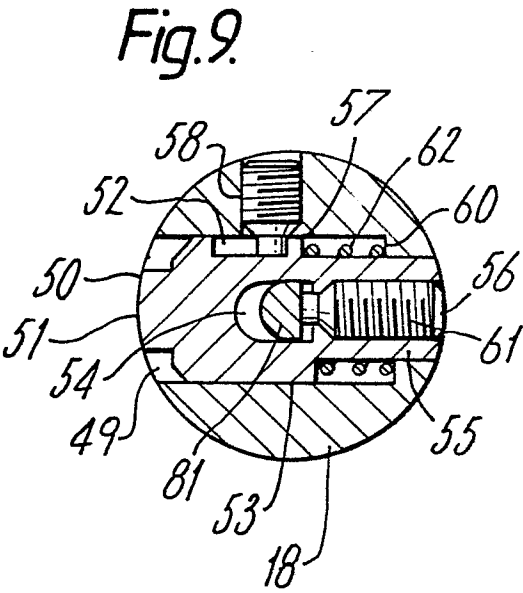
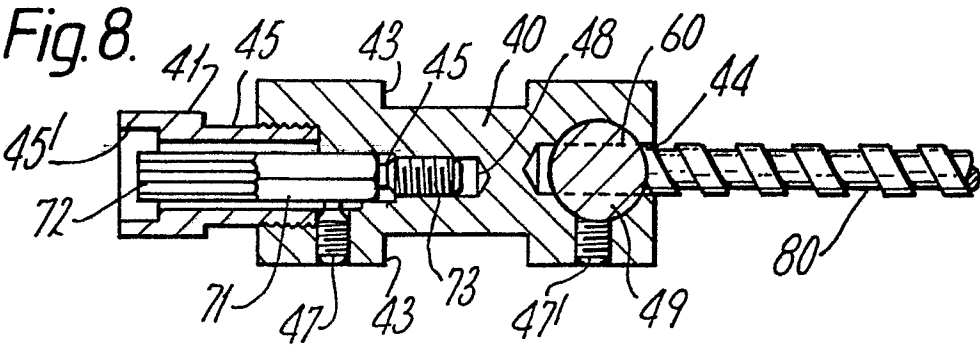


Fig. 11.

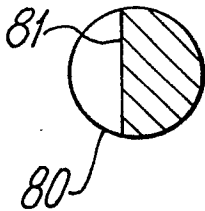


Fig. 12.

