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Bass, Jr. et al.

[11] **3,916,998**

[45] **Nov. 4, 1975**

[54] **DRILLING STABILIZER AND METHOD**

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[52] **U.S. Cl.** ..... **166/301;** 166/241; 166/315; 175/325; 308/4 A

[51] **Int. Cl.²** **E21B 31/00;** E21B 17/10

[58] **Field of Search** ..... 166/301, 315, 241; 175/325; 308/4 A

[56] **References Cited**

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2,855,052	10/1958	Wright et al.	308/4 A
3,276,824	10/1966	Carter	308/4 A
3,482,889	12/1969	Cochran	308/4 A
3,642,079	2/1972	Van Note	175/325

Primary Examiner—James A. Leppink
Attorney, Agent, or Firm—Mason, Fenwick & Lawrence

[57] **ABSTRACT**

A rigid stabilizer sleeve having outwardly extending ribs is slidably received over a collar, internal clamp rings operate to clamp the stabilizer at any desired position on the drill collar; another aspect resides in a structure and method of operation enabling use of a washover tool upon seizure of the string by providing jaw clutch means on opposite ends of each stabilizer and an upwardly facing jaw clutch immediately above the bit so that the stabilizers can be cut by a washover tool to release the clamping means then moved down the string to the next lower stabilizer for engagement with the upper jaw clutch thereon to seize the released stabilizer and enable subsequent cutting through its remaining uncut length and similarly through the length of the other stabilizers until all stabilizers above the point at which the string has been seized have been cut through by the washover tool to enable the tool to clear the seized portion of the string.

10 Claims, 13 Drawing Figures

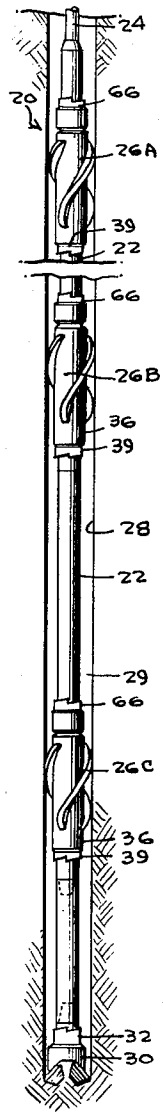


Fig-1-A

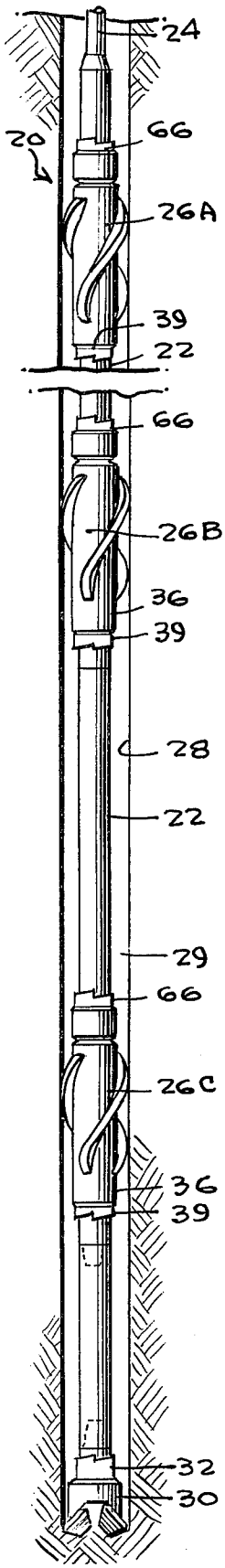


Fig-1-B

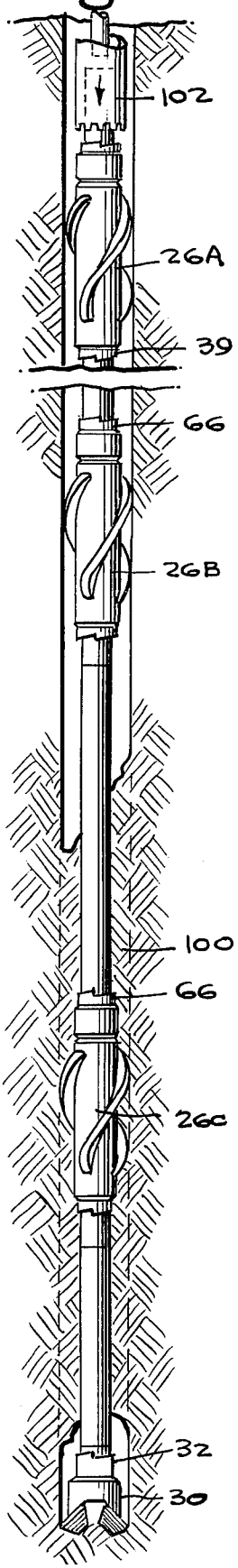


Fig-1-C

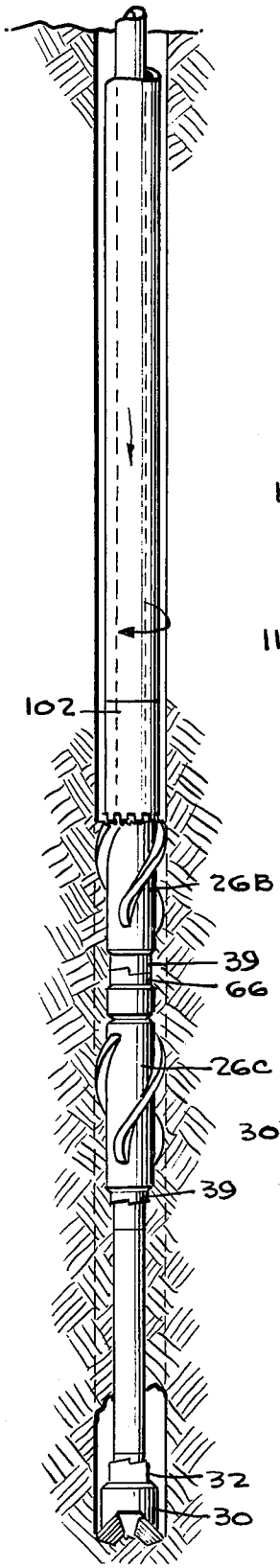
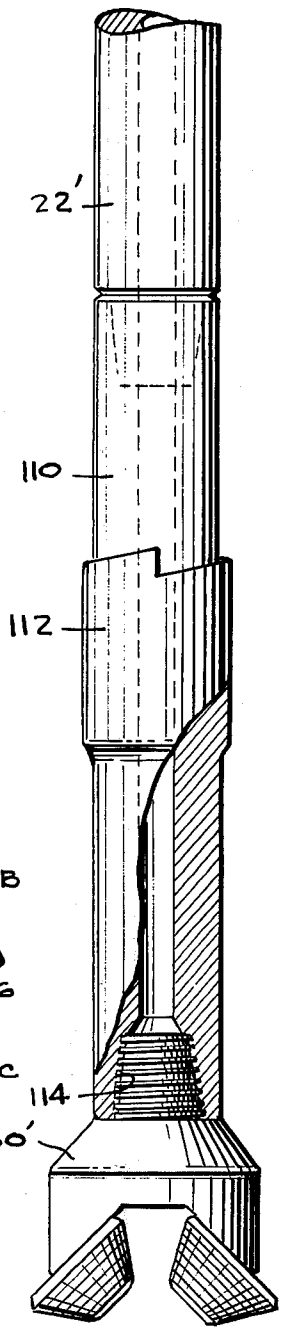


Fig-2



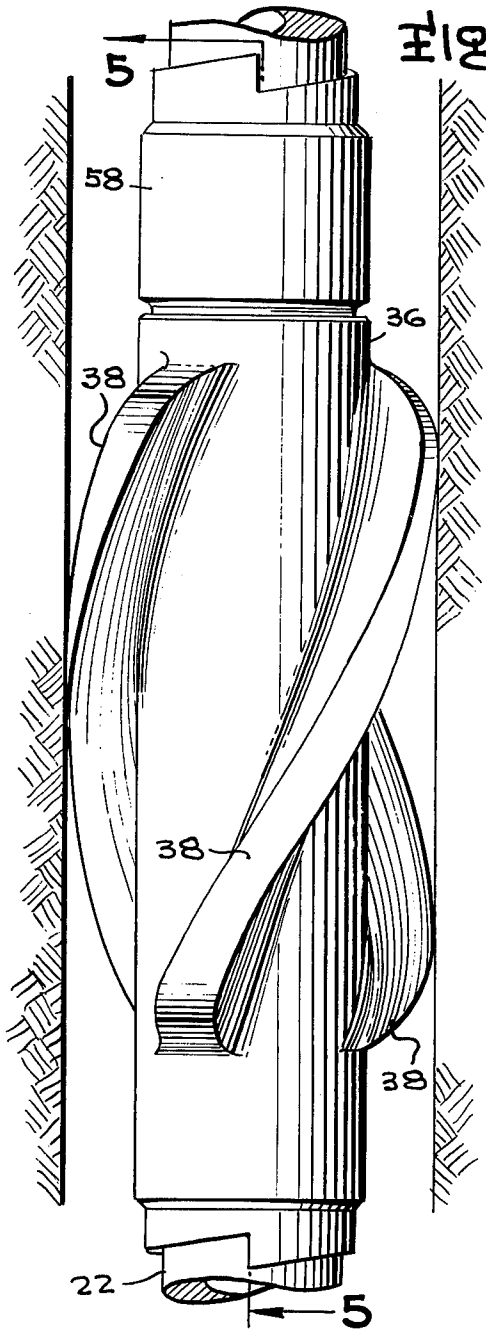


Fig-3

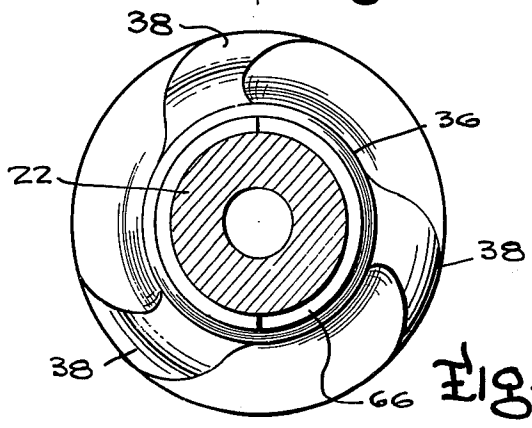


Fig-4

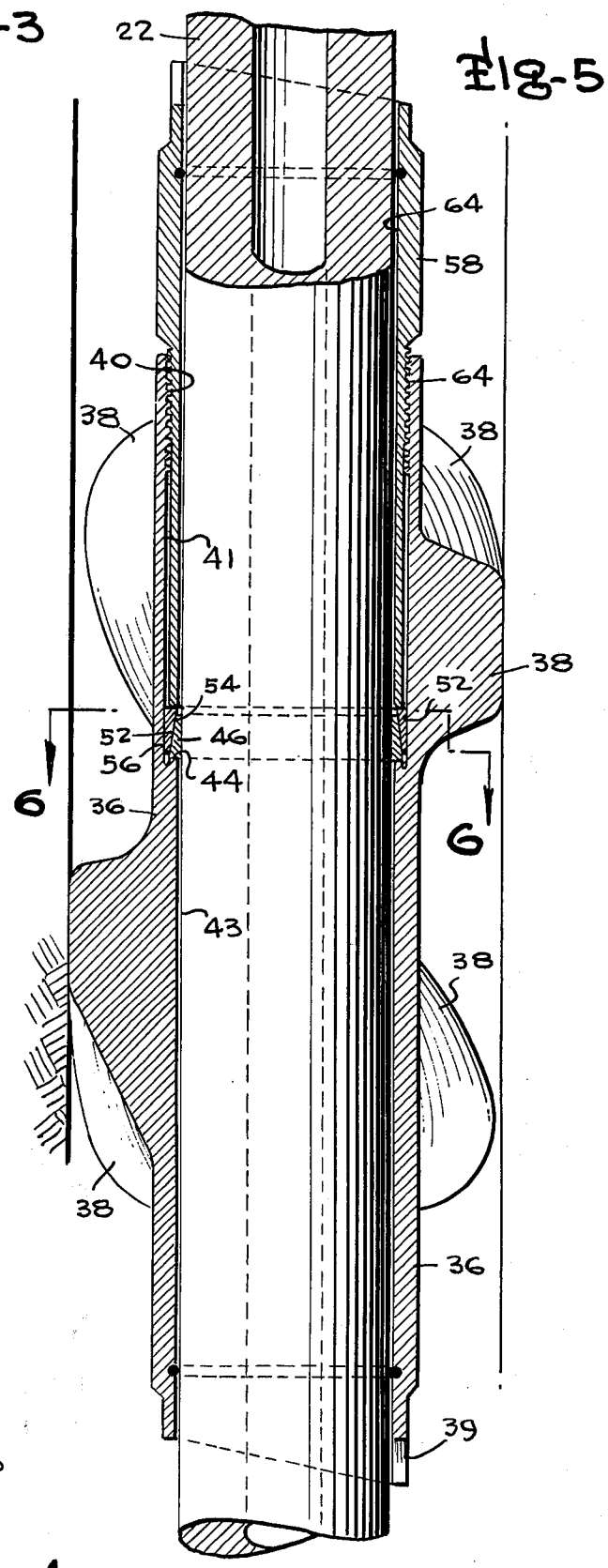


Fig-5

Fig-8

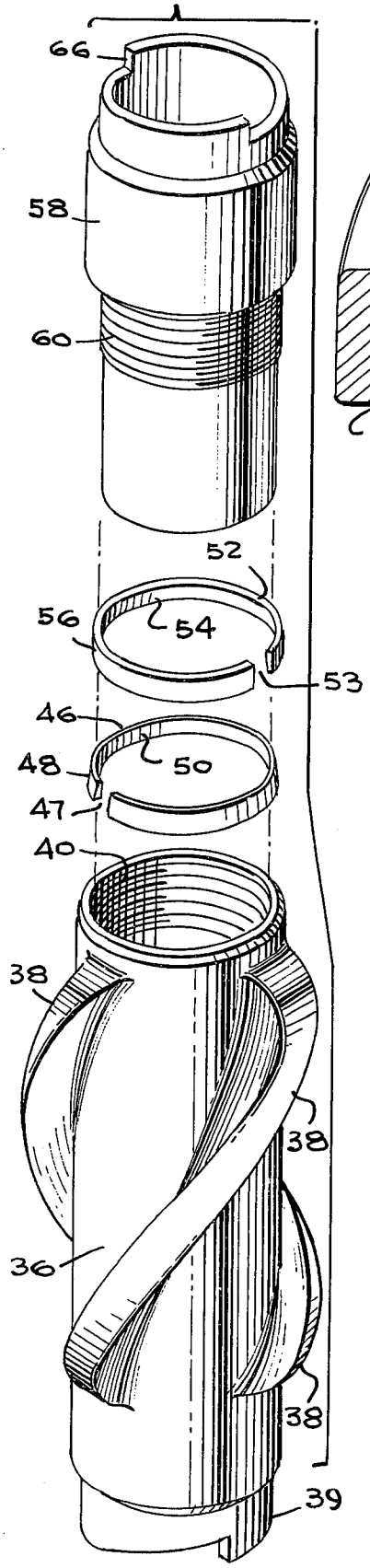
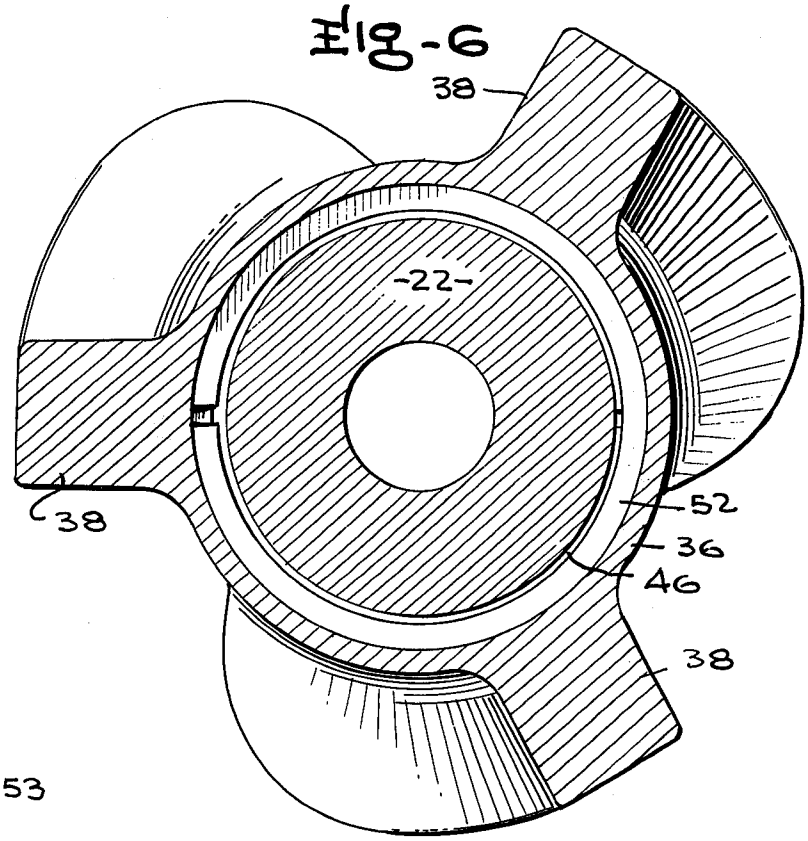


Fig-6



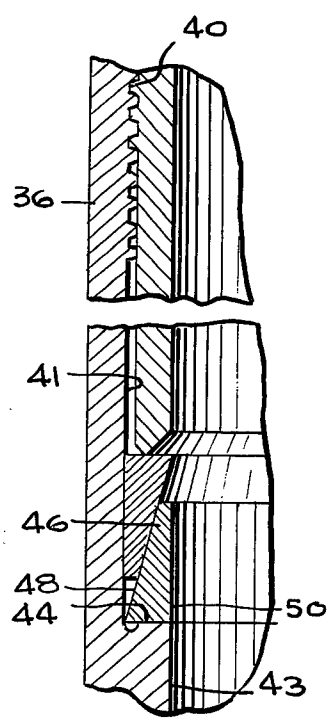


Fig-7-A

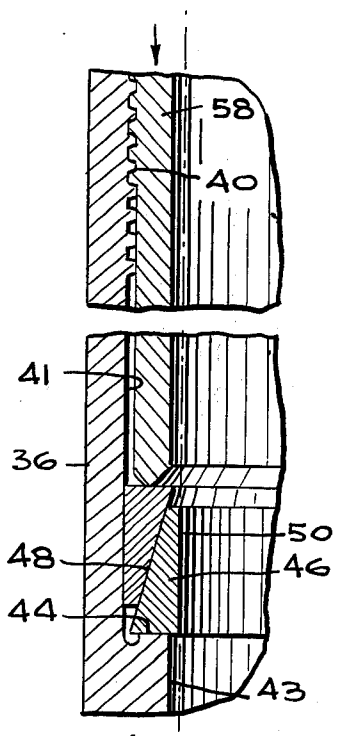


Fig-7-B

Fig-9

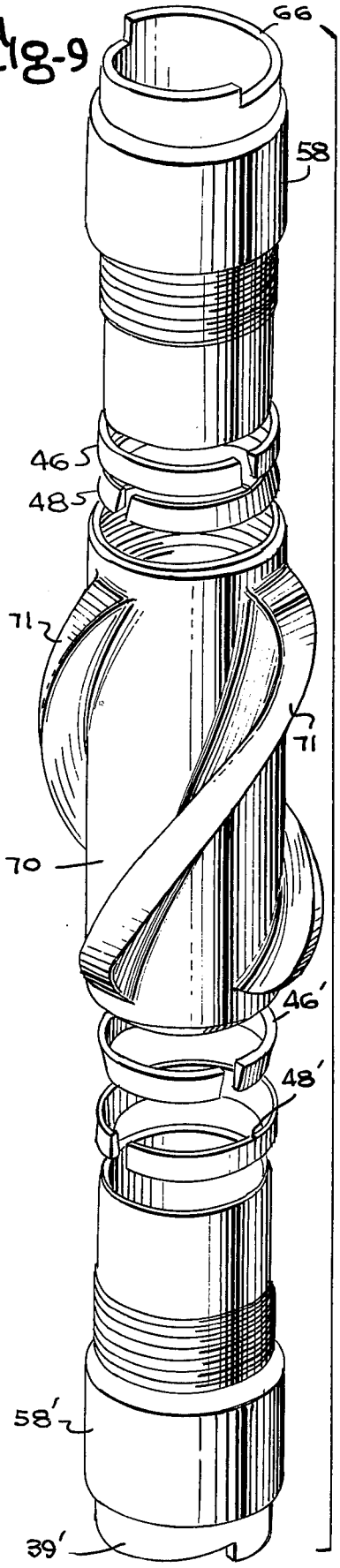
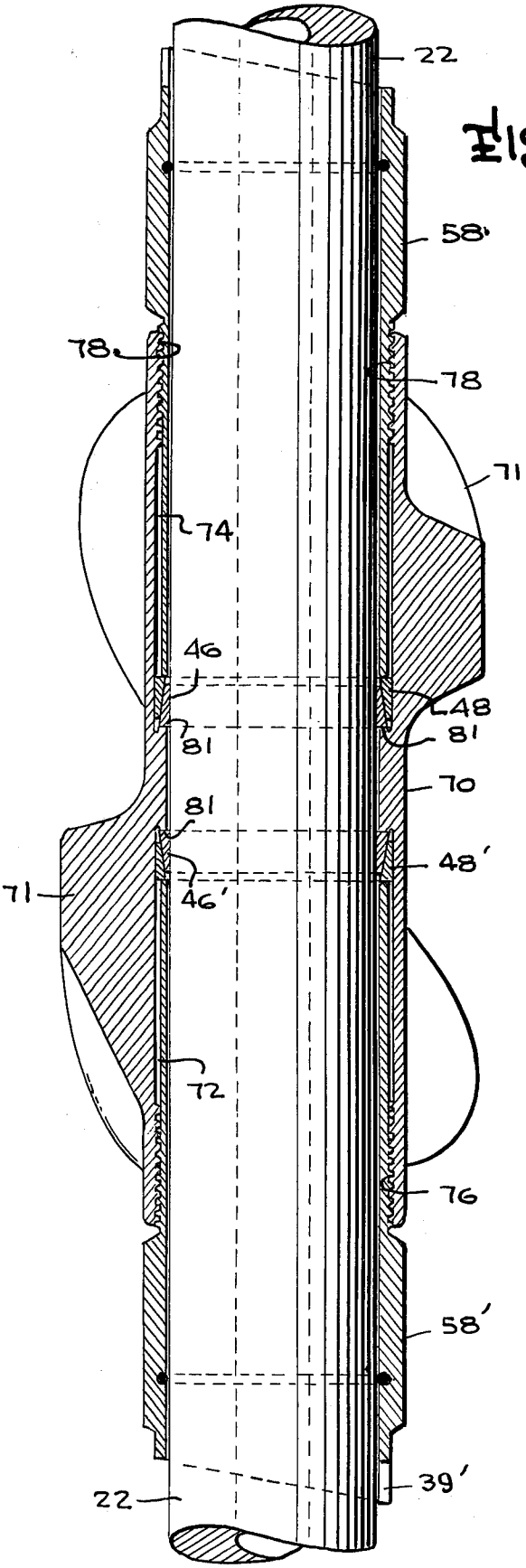

66
58
46
48
71
71
70
46'
48'
58'
39'

Fig-10


22
58'
78
78
71
74
46
48
81
81
70
81
48'
71
46'
72
76
58'
39'
22

DRILLING STABILIZER AND METHOD

This invention is in the field of drilling equipment and methods of operation and is specifically directed to apparatus and methods of achieving optimum drill string stabilization while permitting a washover operation through the stabilizer means in the event the string should be seized by the formation at any point below any of the stabilizers.

The drilling of oil wells, gas wells and similar well bores by the employment of a rotary drill string having a drill collar section above the drill bit necessitates the employment of stabilizer members fixed to the collar section extending above the drill bit. Such stabilizer members usually employ radial ribs or blades which project outwardly to engage the wall of the bore and aid as a guide for the drilling string. The vertical spacing of the stabilizers at specified distances above the drill bit can be critical for achieving various drilling results. However, an exact desired positioning of the stabilizer cannot be achieved with many of the prior known stabilizers which are mounted by threaded connections between the adjacent collar pipe members of the collar section by the employment of threaded male and female connectors on opposite ends of the stabilizer members matable with the male and/or female threaded connectors provided in each end of each of the collar tubular members. The mounting of various different types of stabilizer members between the pipe sections through threaded connectors is illustrated in prior U.S. Pat. Nos. to Rilling No. **3,747,700;** Ortloff et al No. **3,268,274;** Owens No. **3,420,323** and Salvatori No. **3,447,839.**

Attachment of the stabilizers to the drill collars by means of the threaded connectors on each end in the foregoing manner is disadvantageous in that it necessitates a fixed positioning of the stabilizers dependent upon the length of the particular drill collar members with which the stabilizer means is employed. Even more significantly, the employment of threaded connectors matable with the male and female threads on the ends of adjacent collar sections requires that the threads on the stabilizer be accurately machined to correspond with the threads on the end of the drill collar. Since stabilizers are used at remote locations all over the world, machining facilities capable of repairing or providing stabilizers compatible with the particular threaded connections of a particular drill string are not readily accessible and many stabilizers must therefore be discarded rather than repaired for re-use at a particular site. Moreover, when the stabilizers are fabricated at a central location for use throughout the world, it frequently occurs that the threaded connections do not properly mate with the connectors of the drill string. The failure of a threaded connection in any part of a drill string, including the connection between a stabilizer and an adjacent tubular component of the string is an extremely serious matter resulting in much extensive and expensive down time.

Since the threaded connection of the pipe sections and of drill strings are the most common point of failure, the use of stabilizers employing such connections increases the number of threaded connections and the consequent likelihood of string failure.

At the present time, it is impossible to maintain an inventory of stabilizers capable of widespread use due to the different requirements of various drilling installations. For example, the threaded connection of a particular drill string will vary as has been noted previously and it is consequently necessary to fabricate specialized stabilizer members for each particular drilling installation. Moreover, the hole size or the blade size of a particular drilling operation presents specific requirements requiring stabilizer fabrication at or near the site. It is consequently impossible to provide an inventory of stabilizer members having all possible threaded connection dimensions as well as all possible hole size and blade size configurations. Consequently, it is essential that stabilizers be capable of repair and modification by providing different rib sizes and the like at a location near the drilling site. This is no great problem insofar as attachment of the outwardly extending ribs or blades is concerned but does require substantial sophistication in machining as far as the threaded connections are concerned. Consequently, elimination of the threaded connectors from the stabilizers is a highly desirable object.

Another disadvantage of prior known stabilizers resides in the fact that the stabilizer section is much more stiff and rigid than the adjacent pipe section so as to subject the adjacent portions of the pipe sections to substantial bending moments which can result in failure of the pipe sections at or near the threaded connections.

Therefore, the foregoing difficulties with the vast majority of prior known stabilizer members has indicated that a new method of attaching the stabilizer members to the drill string is highly desirable. One proposed solution to the problem is that found in U.S. Pat. No. **3,482,889** in which wedge members mounted on the interior of a stabilizer sleeve are engaged by rotation of the supporting collar section. However, devices of this type suffer from a number of disadvantages both as to cost and operation which have precluded their acceptance as a solution to the above-discussed problems.

Therefore, it is the primary object of the subject invention to provide a new and improved method and apparatus for achieving drill string stabilization.

Another object of the invention is the provision of a new and improved drill string method and apparatus capable of providing optimum drill string stabilization while permitting the unimpaired operation of a washover tool along the length of the string for clearing any obstruction seizing the string.

Achievement of the foregoing objects is enabled by the preferred embodiment of the invention in the form of individual stabilizer members each of which comprises an elongated rigid main sleeve means of cylindrical configuration having an axial passageway extending along its entire length. An inwardly extending fixed abutment means is provided medially of the passageway defining an internal opening of sufficient size to permit the passage of a collar section of the string so that the main sleeve can be slipped over a collar section and axially positioned on the collar section at any desired location. First and second split rings having abutting inclined conical surfaces engageable with each other are provided adjacent the fixed abutment means and an axially movable clamping actuator in the form of a cap sleeve threadably received on the interior of the ain sleeve member is movable against the clamping rings to result in inward clamping force between the main sleeve member and the collar section over which the stabilizer is mounted.

The lower end of the main sleeve is provided with a downwardly facing jaw clutch and the upper end of the cap sleeve is provided with an identical upwardly facing jaw clutch so that a washover tool cutting through the stabilizer will release the clamping rings and the stabilizer will then move downwardly to engage the next adjacent stabilizer member. The jaw clutch on the lower end of the main sleeve will engage the upwardly facing jaw clutch of the cap sleeve of the next lower stabilizer member to prevent further rotation of the upper stabilizer. Consequently, the washover tool can then cut through the remaining portions of the upper stabilizer and eventually work its way down the entire string by a repetitive process. An integral upwardly facing jaw clutch on the upper side of the bit engages the lowermost stabilizer member after it has been released by operation of the washover tool and permits the washover tool to then cut through the lowermost stabilizer member and then through the bit if necessary in order to clear the entire string.

An auxiliary attachment for use with the invention comprises an auxiliary jaw clutch mounted between the lower end of the lowermost collar member and a conventional bit and having an upwardly facing jaw clutch. This auxiliary member is simply a short piece of collar pipe which has an integral upwardly facing jaw clutch extending midway of its length and which is threaded on its upper and lower ends to permit attachment to the lower end of the collar by its upper end to any conventional bit attached at its lower end. Consequently, the inventive stabilizer members per se can be employed without requiring a specialized bit having the integral jaw clutch as discussed previously.

A second embodiment of the invention employs two pairs of cooperating split ring clamp members abutting against an inwardly extending annular rib medially positioned in the main sleeve member. An upper cap sleeve and a lower cap sleeve each having jaw clutches at their outer ends serves to engage the clamp rings to effect a clamping of the stabilizer member to the collar at two different locations to provide increased resistance to axial movement of the stabilizer member on the collar. The second embodiment is used in exactly the same manner as the first embodiment and is capable of being worked upon by a washover tool in exactly the same manner as discussed above with respect to the first embodiment.

The manner in which the preferred embodiments of the invention achieve the objects of the invention will be more readily understood when the following written description is considered in conjunction with the appended drawings in which:

FIG. 1-A is a pictorial elevation of a bore hole illustrating the employment of the inventive stabilizer system in a normal drilling operation;

FIG. 1-B is similar to FIG. 1-A but illustrates the seizure of the lower end of the drill string by a cave-in of the surrounding formation with the initial step of a correcting washover operation being illustrated;

FIG. 1-C is similar to FIG. 1-B but illustrates a subsequent step in the washover operation of the inventive system;

FIG. 2 is a side elevation partially in section of a bit and associated auxiliary clutch sub means employed in one aspect of the inventive system;

FIG. 3 is a side elevation view of the preferred embodiment of the stabilizer means and supporting collar of the inventive system;

FIG. 4 is a top plan view of the stabilizer of FIG. 3;

FIG. 5 is a sectional view taken along lines 5—5 of FIG. 3;

FIG. 6 is a sectional view taken along lines 6—6 of FIG. 5;

FIG. 7-A is an enlarged view of a portion of FIG. 5 illustrating the clamping means in a non-actuated condition;

FIG. 7-B is similar to FIG. 7-A illustrating the clamping members in an actuated clamping condition;

FIG. 8 is an exploded perspective view of the stabilizer member of FIG. 3;

FIG. 9 is an exploded perspective view of a second embodiment of the stabilizer means; and

FIG. 10 is a bisecting sectional view of the embodiment of FIG. 9.

Turning first to FIG. 1-A, a rotary drill string **20** including a plurality of collar sections **22** suspended from drill pipe **24** is disclosed in association in a well-known manner. A plurality of stabilizer members **26A**, **26B**, **26C** etc. are provided on the collar section for engagement with the wall **28** of the well bore **29** and a drill bit **30** is mounted on the lower end of the collar section and includes an upwardly facing jaw clutch **32** formed integrally as a part of the drill head.

Each of the stabilizer members **26A** etc. is formed of a rigid main sleeve **36** having a plurality of outwardly extending riblike blade or flange members **38** extending in a spiral manner from its outer surface and a downwardly facing jaw clutch **39**. Rigid main sleeve **36** also includes an axial passageway extending along its length including a larger portion **40** having threads **41** at its upper end and a lower smaller diameter portion **43** having an upper end termination comprising a radial shoulder **44** which serves a purpose to be described.

Clamping means is provided on the interior of the passageway extending through the main sleeve and comprises an internal split slip ring **46** having a single open slot **47** and outer surface **48** and an internal cylindrical surface **50** dimensioned to fit about the outer periphery of a collar section **22** as shown in FIG. **5**. An external split slip ring **52** having a single open slot **53** and a reverse configuration to that of ring **46** is provided adjacent ring **46** and has an inwardly facing tapered conical surface **54** contiguously engaging the conical outer surface **48** of the internal ring member **44**. The outer surface **56** of ring member **52** is cylindrical and dimensioned to engage the smooth surface of the large diameter portion of the axial passageway extending the length of the main sleeve member. It is of extreme importance that the relatively small area of surface **50** of ring **46** is the only part of the stabilizer assembly engaging the collar **22** so that there is no stiffening of any substantial length of the collar section in the area of the stabilizer — the foregoing fact precludes the buildup of high stresses in the collar during flexing of the collar as would occur if the stabilizer engaged the collar along a substantial length of the collar.

A clamping actuator in the form of an externally threaded cap sleeve **58** having threads **60** compatible with the threaded portion **40** of the internal passageway of the main sleeve **36** is received in the upper end of the main sleeve and includes an axial passageway **64** of sufficient size to easily slide over the collar pipe **22**. An

upwardly facing jaw clutch **66** is provided on the upper end of the cap sleeve **58** and is dimensioned and shaped to cooperate with the jaw clutch **39** integrally provided on the lower end of the main sleeve **36** of any other stabilizer.

In operation, the entire assembly is positioned on the collar section **22** and the main sleeve **36** rigidly held in position with cap sleeve **58** then being rotated to move axially downwardly within the confines of the main sleeve to move the split ring clamp members **46** and **52** from the position illustrated in FIG. **7**-A toward the position illustrated in FIG. **7**-B. The foregoing movement results in inward movement of the inner cylindrical surface **50** of the split ring member **46** so that the surface is forcefully urged into clamping engagement with the outer surface **22** of the collar pipe section in an obvious manner. Consequently, the stabilizer can be fixed in position at any desired point along the length of the collar section. It is reemphasized that only the internal surface **50** of the stabilizer actually engages the collar section so as not to impede bending movement of the collar section and to consequently avoid high collar stresses as would occur if the rigid stabilizer sleeve were engaged along its entire length with the outer surface of the collar section.

Turning now to FIGS. **9** and **10,** the second embodiment of the invention will be discussed with it being initially noted that the second embodiment is closely similar to the first embodiment with the exception that two pairs of clamping rings are provided for achieving additional clamping engagement of the stabilizer on the collar in circumstances in which the stabilizer is likely to be subjected to additional forces which might tend to axially shift the stabilizer on the collar.

More specifically, an elongated rigid main sleeve **70** with spiral blades **71** is provided with an axial passageway extending along its entire length and including a lower portion **72** of enlarged diameter and an upper portion **74** also of the same enlarged diameter. The lower end of the large diameter portion **72** is threaded at **76** (FIG. **10**) and the upper end of the portion **74** is similarly threaded at **78.** An inwardly extending annular rib **80** having a smaller internal diameter than the portions **72** and **74** is provided medially of the main sleeve and provides radial abutment shoulders **81** for upper split clamp ring members **46** and **48** identical to the same members discussed with respect to the first embodiment. Similarly, a pair of lower split ring clamp members **46'** and **48'** are provided immediately adjacent the opposite sides of the annular rib **80** with ring **46'** being in abutting engagement with lower shoulder **81.** It should be understood that all of the split ring clamp members comprising members **46** and **52** of the first embodiment and **46'** and **48'** of the second embodiment all extend circumferentially through an angle only slightly less than a complete circle and have only a single opening which permits radial flexure of the ring members. The inner surfaces of the ring members **46** and **46'** are the only elements actually contacting the collar in a forceful manner since the inner surface of annular rib **80** defines an opening of greater diameter than the outer diameter of the collar section **22.**

An upper cap sleeve member **58** identical to the cap sleeve **58** of the first embodiment is provided in the upper end of the main sleeve in threaded connection with the sleeve in exactly the same manner as in the first embodiment. Similarly, a lower cap sleeve **58',** which is also identical to the sleeve **58,** and has a downwardly facing jaw clutch **39'**, is provided in threaded engagement with the threads **76** in the lower end of the main sleeve **70.** Rotation of the cap sleeve members **58** and **58'** serves to provide dual clamping of the collar **22** in an obvious manner. The abutting surfaces of the cap sleeves and split clamp ring members are hardened to prevent deformation of these components.

The manner in which the inventive system is employed for stabilizing a drill string and for use in a washover operation will now be discussed with attention initially being invited to FIG. **1**-A. It will be noted that the drill pipe **24** supports a plurality of collar section members **22** with a plurality of stabilizer members **26A** etc. being positioned along the drill collar section. For the purposes of discussion, three stabilizer members are disclosed comprising an uppermost stabilizer **26A,** a second uppermost stabilizer **26B** and a lowermost stabilizer **26C.**

In FIG. **1**-A, the system is shown in normal operation and in FIG. **1**-B, the system is shown with the lower portion of the string being seized by a formation cave-in in the area **100.** When such an unfortunate eventuality occurs, it is necessary to cut through the seized area by means of a washover tool **102** in a well-known manner. However, with the clamp-on stabilizers of the present invention, the washover tool **102** would merely partially cut through the stabilizer member until such time as the clamping effect of the ring members **46** and **48** should be released at which time the stabilizer member would simply start to rotate with the washover tool and would move down the string. Continued operation of the washover tool would fail to provide any further cutting operation unless the stabilizer means previously released from clamping engagement with the string should fortuitously be engaged with the formation or some other element preventing further rotation of the tool and enabling the washover tool to consequently cut through the remaining portions of the stabilizer member. Release of the uppermost stabilizer **26A** from clamping engagement with the collar pipe causes the stabilizer to move downwardly to the second uppermost stabilizer **26B** therebeneath so that the lower jaw clutch **39** of the uppermost stabilizer **26A** engages the upwardly facing jaw clutch **66** of the next adjacent stabilizer **26B.** Engagement of the jaw clutches prevents any further rotation of the uppermost stabilizer member **26A** and consequently permits the washover tool **102** to consequently cut through the remaining portions of the uppermost stabilizer **26A.**

Upon completion of the cutting operation through the entire length of the uppermost stabilizer **26A,** the washover tool **102** immediately begins to cut the upper portion of the second uppermost stabilizer **26B** in an obvious manner, and consequently releases the slip clamp ring members of the second uppermost stabilizer member so that it is then moved down over the collar section to engage the lowermost stabilizer member **26C** as shown in FIG. **1**-C. Engagement of the lower jaw clutch **39** on stabilizer **26B** with the upwardly facing jaw clutch **66** of the lowermost stabilizer **26C** prevents further rotation of stabilizer member **26B** so that the washover tool can complete cutting through the stabilizer member **26B.** Continued operation of the washover tool then results in freeing of the lowermost stabilizer **26C** from engagement with the collar section and the lowermost stabilizer is then moved downwardly

to engage the upwardly facing jaw clutch **32** integrally formed with the bit **30.** Engagement of the downwardly facing jaw clutch **39** of the lowermost stabilizer **26C** with jaw clutch **32** prevents further rotation of the lowermost stabilizer **26C** so that the washover tool can then continue cutting through the lowermost stabilizer and then through the bit if necessary to remove the drilling obstruction.

FIG. **2** illustrates an attachment which enables a conventional bit **30'** not having a unitary jaw clutch to be used with the inventive stabilizer members. Specifically, a short collar type pipe section **110** having an integral jaw clutch section **112** medially of its length is threadably received on the lowermost end of the lowermost collar section **22'**. The lower end of the member **110** is provided with a threaded opening **114** for receiving the mounting threads of the bit **30'** in an obvious manner. Jaw clutch portion **112** serves to engage the downwardly facing jaw clutch **39** of the lowermost stabilizer in a washout operation in exactly the same manner as jaw clutch **32** of the preferred embodiment. This attachment is of particular utility in enabling the utilization of specialized drill bits not having an integral jaw clutch in the manner of bit **30** of the preferred embodiment.

In field use, each stabilizer would be provided with sets of four or more internal slip rings **46** and/or **46'** of differing internal diameters so as to permit usage of the stabilizer on dull collars of differing outside diameter such as worn dull collars, factory reject drill collars or drill collars having eccentric wear.

While numerous modifications of the subject invention will be apparent to those of skill in the art, it should be understood that the spirit and scope of the invention is to be limited solely in light of the appended claims.

We claim:

1. A drill collar stabilizer comprising rigid main sleeve means, an axial passageway extending the entire length of said rigid main sleeve means and including an inwardly extending fixed abutment means medially of said passageway the innermost extent of which abutment means defines an opening of sufficient size to permit said sleeve to be slidably received over a drill collar for axial movement along the drill collar, radially extending flange means extending outwardly of said sleeve means, clamping means positioned internally of said rigid main sleeve means adjacent said fixed abutment means and selectively operable for fixedly clamping said rigid main sleeve means to a collar over which said rigid main sleeve means is positioned and clamping actuator means mounted in said rigid main sleeve means for movement toward said fixed abutment means while engaging said clamping means for actuating said clamping means.

2. A drill collar stabilizer as recited in claim **1** additionally including internal main sleeve thread means in said axial passageway, and wherein said clamping actuator means includes threaded cap sleeve means having a threaded portion mating with said internal main sleeve thread means whereby rotation of said cap sleeve means in one direction with respect to said rigid main sleeve means effects axial movement of said cap sleeve means internally of the main sleeve means to effect compression of said clamping means while rotation of said threaded cap sleeve means in an opposite direction effects release of compression of said clamping means.

3. The invention of claim **2** wherein said inwardly extending fixed abutment means comprises an annular rib positioned medially of said passageway, said internal main sleeve thread means comprises first and second threaded portions of said passageway on opposite sides of said annular rib and said cap sleeve means comprises first and second threaded cap sleeves respectively received in said first and second threaded portions.

4. The invention of claim **3** wherein said clamping means comprises first and second pairs of overlying inner and outer split ring means each having a single opening and respectively positioned on opposite sides of said annular rib, one ring of each pair of split ring members engaging said annular rib with each pair of rings including abutting conical surfaces oriented so that axial movement of one split ring means of each pair relative to the other split ring means of the same pair results in clamping or unclamping movement of the inner split ring means of said pair or rings.

5. The invention of claim **1** wherein said clamping means comprises first and second overlying inner and outer split ring clamping means each having a single opening and one of which engages said fixed abutment means and including abutting conical surfaces oriented so that axial movement of one split ring means relative to the other split ring means results in clamping or unclamping movement of the inner split ring clamping means.

6. A drill collar stabilizer as recited in claim **5** additionally including internal main sleeve thread means in said axial passageway, and wherein said clamping actuator means includes threaded cap sleeve means having a threaded portion mating with said internal main sleeve thread means whereby rotation of said cap sleeve means in one direction with respect to said rigid main sleeve means effects axial movement of said cap sleeve means internally of the main sleeve means to effect axial movement of one of said split ring means with respect to the other split ring means to cause clamping movement of the inner split ring means while rotation of said threaded cap sleeve means in an opposite direction effects unclamping movement of the inner split ring means.

7. The invention of claim **6** additionally including an upwardly facing jaw clutch and a downwardly facing jaw clutch on the upper and lower ends of each stabilizer.

8. A drilling system comprising a drill string having a bit at its lower end, a plurality of stabilizer members spaced along the length of said drill string, each of said stabilizer members including clamping means clampingly engaging said stabilizer members at a desired location on the drill string, each of said stabilizer members including an upwardly facing jaw clutch means and a downwardly facing jaw clutch means respectively positioned at the upper and lower ends of each stabilizer member, the upper jaw clutch means on each stabilizer member being compatible with and capable of mating engagement with the lower jaw clutch of each stabilizer member and an upwardly facing bit jaw clutch means associated with said bit below the lowermost stabilizer member and compatible and mateable with the downwardly facing jaw clutch or the lowermost stabilizer so that operation of a washover tool can effect release of the clamping portion of the uppermost stabilizer member followed by movement of the uppermost stabilizer member into fixed engagement with the

next uppermost stabilizer member to effect cutting through of the uppermost stabilizer members and succeeding cutting in like manner of the remaining stabilizer members to effect release of the string in the event of seizing of the string.

9. The invention of claim **8** wherein said bit jaw clutch is formed integrally with said bit.

10. A method of providing optimum stabilization of a drill string and conducting a washover operation in the event of seizing of the string, said method comprising the steps of providing a plurality of stabilizer members spaced along the length of a drill string having bit means at its lower end, actuating clamping means on each stabilizer member for clamping each stabilizer member at a desired location on the drill string, initiating movement of a washover tool down the string upon seizing upon the string to initially engage the uppermost stabilizer member and cut the clamping means of the uppermost stabilizer member to release the clamping means holding the uppermost stabilizer member on the string, moving the uppermost stabilizer member down the string with the washover tool and engaging the lower end of the uppermost stabilizer member with the second uppermost stabilizer member to prevent further rotation of the uppermost stabilizer member, operating the washover tool to cut through remaining portions of the uppermost stabilizer member and then through the clamping means of the second uppermost stabilizer member to release the second uppermost stabilizer member from clamping engagement with the string, moving the second uppermost stabilizer member down the string to engage the third uppermost stabilizer member to prevent further rotation of the second uppermost stabilizer member, operating the washover tool to cut through remaining portions of the second uppermost stabilizer member, continuing operation of the washover member to cut through the clamping means of remaining stabilizer members and remaining portions of remaining stabilizer members until the lowermost stabilizer member has been released from clamping engagement with the string, moving the lowermost stabilizer member into engagement with the bit to prevent further rotation of the lowermost stabilizer member and operating the washover tool for cutting through remaining portions of the lowermost stabilizer member.

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