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(54) **FLEXIBLE SINKER BAR ASSEMBLIES**

FLEXIBLE SINKGEWICHTANORDNUNG

ENSEMBLES BARRE DE SURCHARGE FLEXIBLES

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Description

[0001] The invention relates to apparatus for recovering logging tools from a well bore and, more particularly, to improved, flexible connectors which may, preferably, be in the form of flexible wire rope sinker bar assemblies to replace the known type of rigid sinker bar. When wireline strip over operations are conducted on drilling rigs that utilize top drive systems, potentially serious problems can be encountered when the conventional rigid type sinker bar assemblies are forced to pass around the top drive housing.

[0002] Conventional wireline fishing operations are comprised of a number of conventional steps, including:

1. A T-bar clamp is clamped onto the logging line and hung off at the rotary tnble of the rig.
2. The wireline above the T-bar clamp is cut, and a connector is attached to the end of the cable sticking out of the top of the T-bar clamp assembly.
3. Normally, a rigid sinker bar assembly is attached to the portion of the logging line that is run up and down in the derrick. The typical sinker bar assembly is approximately 20 feet long, and a connector on the lower end of the sinker bar assembly is compatible with a connector on the logging line hung off in the T-bar clamp.
4. Prior to beginning a strip over operation, the sinker bar connector is made-up to the end connector on the logging line hung off in the T-bar clamp. Using the logging winch, tension is applied to the logging line, and the T-bar clamp assembly is removed.
5. The wireline connector assembly is then lowered and positioned near the top of the box connection of the drill pipe hung off in the rotary table.
6. Using a hang-off plate, the lower part of the connector is hung off on top of the box connection. The lower sinker bar connector is disconnected to allow the sinker bar assembly to be raised to the racking board (monkey board) level in the derrick.
7. A stand of drill pipe is then latched into the elevators at the racking board height in the derrick. The sinker bar on the logging line is guided (stabbed) into the top of the stand of drill pipe by the derrickman. Next, the sinker bar is lowered down and out through the bottom end of a stand of drill pipe at the rig floor.
8. The sinker bar assembly is then reattached to the connector on the logging line hung off in the hang-off clamp at the rig floor.
9. Tension is taken on the logging line, and the hang-off clamp is removed.
10. The lower end of the drill pipe stand is slowly lowered over the wireline sinker bar assembly at the rig floor, and the drill pipe connection is made up.
11. Next, the stand of drill pipe is slowly lowered in the hole, stripping over the logging line and sinker bar assembly. Once the drill pipe is hung off in the rotary table, the wireline stripping operation can be continued in this manner until the logging tool is washed over with the fishing tool assembly.

[0003] When this type of wireline strip over operation is conducted on drilling rigs that utilize top drive systems, problems can be encountered with rigid sinker bar assemblies. Problems occur because when the top drive approaches the rig floor and the drill pipe is hung off in the rotary table, the rigid sinker bar exits the drill pipe. At this point in the strip over operation, with tension on the wireline, it is necessary for the sinker bar assembly to pass around the outside of the top drive housing. The rigid sinker bar assembly can be put in an overload situation when the sinker bars are forced to bend around the outside of the top drive body. As a result, the threaded connections can fail and this presents a serious safety hazard to rig personnel and also to the wellbore.

[0004] As a result of these safety concerns, the present invention has been developed in order to alleviate the above described problems. The present invention is defined in the appended claims, to which the reader is referred, and attention is drawn to the disclosure of US Patent No. 4,901,804 which discloses an articulated downhole surveying instrument comprising a sinker bar assembly including various integers described in the preamble of present claim 1.

In the invention, a flexible connector, preferably in the form of a flexible, wire rope sinker bar assembly, replaces the known type of rigid sinker bar assembly described above, thereby resulting in a safer and more efficient wireline stripping operation. According to the present invention is provided a flexible sinker bar assembly for use with a top drive housing in wireline stripping operations and the like in connection with a wellbore, said apparatus including a flexible connector member having a pair of opposite ends and top and bottom socket members fixedly secured to said ends for adding increased weight thereto, and means for attachment of said sockets to other wireline hardware, characterised in that at least one dog knot is secured to said flexible member for further increasing the weight of said flexible sinker bar. Embodiments with different sizes and types of flexible sinker bar have been designed for specific drill pipe sizes in order to meet allowable work ratings.

[0005] Embodiments of the invention will now be described with reference to the accompanying drawings, in which:

FIG. 1 shows a wireline stripping assembly including a flexible sinker bar in accordance with the invention.

FIG. 2 shows a fragmentary, enlarged portion of FIG. 1, partly in section, illustrating one form of flexible sinker bar in accordance with the invention.

FIG. 3 shows a modified form of wireline stripping assembly including another form of flexible sinker bar in accordance with the invention.

FIG. 4 shows a fragmentary, enlarged portion of FIG. 3, partly in section, illustrating one modified form of flexible sinker bar in accordance with the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0006] A wireline stripping assembly, generally indicated by the numeral 10, that encompasses a plurality of different sections shown bracketed in FIG. 1 as including an upper rope socket section 12 that provides a slim-line socket 14, and a lower rope socket section 16 that provides a similar slim-line socket 18 which is sized to cooperate with a hang off plate 20.

[0007] Located above the lower rope socket section 16 is a spear section 22 comprised of a spear 24 having a tapered head 26 to provide for easy entry into an overlying overshot 28 that forms the overshot section 30. A swivel section 32 includes a rugged dual bearing swivel 34.

[0008] Interposed between swivel section 32 and upper rope socket section 12 is a sinker bar section 40 that encompasses a flexible sinker bar assembly, generally indicated by the numeral 42, the details of which are best shown in enlarged form in FIG. 2. Sinker bar assembly 42 is, in one form of the invention, comprised of a flexible connector in the form of a length of wire rope 44, that is shown in the form of a woven strand or cable, that provides flexibility to the sinker bar assembly 42 and which is fitted at its ends with a respective top socket 46 and a bottom socket 48, each having an internally threaded box connection 50 and 52 for attachment to other wireline hardware, such as swivel 34 and the like. Top socket 46 and bottom socket 48 are similarly constructed and may be installed on the wire rope or cable 44 with a cured resin 54 shown in the sectional view of top socket 46. Resin 54 may be applied in liquid or paste form and is then allowed to cure, i.e., harden to provide a high strength bond between the sockets and wire rope.

[0009] Sinker bar assembly 42 is amenable to having additional weight applied thereto through the use of a plurality of dog knots 60, one of which is shown in section in FIG. 2 below top socket 46. The dog knots 60 can be swaged onto the rope or cable 44 while maintaining flexibility of the assembly 42.

[0010] The length shown at L in FIG. 2, extending between top socket 46 and bottom socket 48, can be on the order of approximately 20 feet. Sockets 46 and 48 are purposely thin in diameter, shown at D near the bottom of socket 48 to provide clearances for running inside a drill pipe (not shown), but provide heavy duty construction for make-up to wireline retrieval assemblies. Dog knots 60 are added for sinker bar assemblies that may have wire rope 44 between 1 3/8 inch and 2 inch; the added weight improves the movement of the assembly through the drill pipe.

[0011] FIGS. 3 and 4 illustrate a modification of the apparatus shown in FIGS. 1 and 2. A modified wireline stripping assembly, generally indicated by the numeral 100, that encompasses a plurality of different sections shown bracketed in FIG. 3 as including an upper rope socket section 112 that provides a slim-line socket 114, and a lower rope socket section 116 that provides a similar slim-line socket 118 which is sized to cooperate with a hang off plate 120.

[0012] Located above the lower rope socket section 116 is a spear section 122 comprised of a spear 124 having a tapered head 126 to provide for easy entry into an overlying overshot 128 that forms the overshot section 130. A swivel section 132 includes a rugged dual bearing swivel 134.

[0013] Interposed between swivel section 132 and upper rope socket section 112 is a sinker bar section 140 that encompasses a flexible sinker bar assembly, generally indicated by the numeral 142, the details of which are best shown in enlarged form in FIG. 4. Sinker bar assembly 142 is, preferably, comprised of a flexible connector in the form of a length of wire rope 144, that is shown in the form of a woven strand or cable, that provides flexibility to the sinker bar assembly 142 and is fitted at its ends with a respective top socket 146 and a bottom socket 148, each preferably having an internally threaded box connection 150 and 152, or other provision, for attachment to other wireline hardware, such as swivel 134 and the like. Top socket 146 and bottom socket 148 are similarly constructed to provide a slim-line socket configured for large diameter wire rope, or the like, and are installed on the wire rope or cable 144, preferably by being swaged thereon, to provide for increased sinker bar weight and assurance against slippage or disconnection from the flexible connector, wire rope, strand or cable.

[0014] It is to be noted that the embodiment of FIGS. 3 and 4 does not include the provision of a plurality of dog knots, such as the dog knots 60 shown in FIGS. 1 and 2. There are some operations for which the additional weight of the dog knots is not necessary.

[0015] The length shown at L-2 in FIG. 4, extending between top socket 146 and bottom socket 148, can be on the order of approximately 20 feet, more or less. Sockets 146 and 148 are purposely thin in diameter, shown at D-2 near the bottom of socket 148 to provide clearances for running inside a drill pipe (not shown), but provide heavy duty construction for make-up to wireline retrieval assemblies.

[0016] From the foregoing description, it will be apparent to those skilled in the art that the various forms of the invention provide many advantages and safety features over the known types of rigid sinker bars. While specific showings and descriptions are provided, it is to be understood that differences in size, weight, length, diameters, etc. can be made depending upon variations in any particular wireline operation.

Claims

1. A flexible sinker bar assembly for use with a top drive housing in wireline stripping operations and the like in connection with a wellbore, said apparatus including a flexible connector member (44) having a pair of opposite ends and top and bottom socket members (46, 48 or 146 and 148) fixedly secured to said ends for adding increased weight thereto, and means for attachment of said sockets to other wireline hardware,

   characterised in that at least one dog knot (60) is secured to said flexible member for further increasing the weight of said flexible sinker bar.

2. A flexible sinker bar assembly as defined in claim 1 wherein said socket members (46 and 48) are secured to said connector member with cured resin (54).

3. A flexible sinker bar assembly as defined in claim 1 wherein said socket members (146 and 148) are secured to said connector member by being swaged thereto.

4. A flexible sinker bar assembly as defined in any preceding claim wherein said sinker bar is approximately 20 feet in length.

5. A flexible sinker bar assembly as defined in any preceding claim wherein said flexible connector member (44) is comprised of heavy metal wirerope.

6. A flexible sinker bar assembly as defined in any one of claims 1 to 4 wherein said flexible connector member (44) is comprised of a heavy metal flexible cable.

7. A flexible sinker bar assembly as defined in any preceding claim wherein said means for attachment of said sockets to other wireline hardware comprises threaded end portions at free ends of said sockets.

Revendications

1. Ensemble de barres de plomb flexible pour l'utilisation avec un carter d'entraînement supérieur lors d'opérations de dépouillement à câble métallique et de même, en connexion avec un trou de puits, ledit appareil incluant un élément de connexion flexible (44) ayant une paire d'extrémités opposées et des éléments de douilles supérieure et inférieure (46, 48 ou 146 et 148), disposées de manière fixe aux deux extrémités pour appliquer une augmentation de poids dessus, et des moyens pour l'attachement des douilles à d'autres matériels en câble métallique,

   caractérisé en ce qu'au moins un noeud massique (60) est fixé aux dits éléments flexibles pour augmenter de manière supplémentaire le poids de ladite barre de plomb flexible.

2. Ensemble de barres de plomb flexible selon la revendication 1, **caractérisé en ce que** lesdits éléments de douilles (46 et 48) sont fixés audit élément de connecteur avec de la résine traitée (54).

3. Ensemble de barres de plomb flexible comme défini dans la revendication 1, **caractérisé en ce que** lesdits éléments de douilles (146 et 148) sont fixés audit élément de connecteur en étant estampés dessus.

4. Ensemble de barres de plomb flexible comme défini dans l'une des revendications précédentes, **caractérisé en ce que** ladite barre de plomb est approximativement de 20 pieds en longueur.

5. Ensemble de barres de plomb flexible comme défini dans l'une des revendications précédentes, **caractérisé en ce que** ledit élément de connexion flexible (44) est composé de filins d'acier en métaux lourds.

6. Ensemble de barres de plomb flexible comme défini dans l'une des revendications 1 à 4, **caractérisé en ce que** ledit élément de connexion flexible (44) est composé de câbles flexibles en métaux lourds.

7. Ensemble de barres de plomb flexible comme défini dans l'une des revendications précédentes, **caractérisé en ce que** lesdits moyens pour l'attachement desdites douilles à d'autres matériels en câble métallique comprennent des parties d'extrémité filetée aux extrémités libres des dites douilles.

Patentansprüche

1. Biegsame Sinkgewichtanordnung zur Verwendung mit einem Gehäuse für einen oberen Antrieb bei Drahtseil-Abräumvorgängen und dergleichen im Zusammenhang mit einer Brunnenbohrung, wobei die Anordnung ein biegsames Verbindungselement (44) mit einem Paar von einander gegenüberliegenden Enden sowie obere und untere Fassungselemente (46, 48 oder 146 und 148), die fest an den Enden angebracht sind, um diesen zusätzliches Gewicht zu verleihen, sowie Mittel zur Befestigung der Fassungen an anderen Drahtseilteilen aufweist, **dadurch gekennzeichnet, daß** an dem biegsamen Element mindestens ein massiver Kloben (60) angebracht ist, um das Gewicht des biegsamen Sinkgewichtes weiter zu erhöhen.

2. Biegsame Sinkgewichtanordnung nach Anspruch

1, bei der die Fassungselemente (46 und 48) mit gehärtetem Harz (54) an dem Verbindungselement befestigt sind.

3. Biegsame Sinkgewichtanordnung nach Anspruch 1, wobei die Fassungselemente (146 und 148) an dem Verbindungselement durch Aufpressen angebracht sind.

4. Biegsame Sinkgewichtanordnung nach einem vorhergehenden Anspruch, wobei das Sinkgewicht eine Länge von etwa 20 Fuß aufweist.

5. Biegsame Sinkgewichtanordnung nach einem vorhergehenden Anspruch, wobei das biegsame Verbindungselement (44) aus Schwermetall-Drahtseil besteht.

6. Biegsame Sinkgewichtanordnung nach einem der Ansprüche 1 bis 4, wobei das biegsame Verbindungselement (44) aus biegsamem Schwermetallkabel besteht.

7. Biegsame Sinkgewichtanordnung nach einem vorhergehenden Anspruch, wobei die Mittel zur Befestigung der Fassungen an anderen Drahtseilteilen Gewinde-Endabschnitte an freien Enden der Fassungen aufweisen.

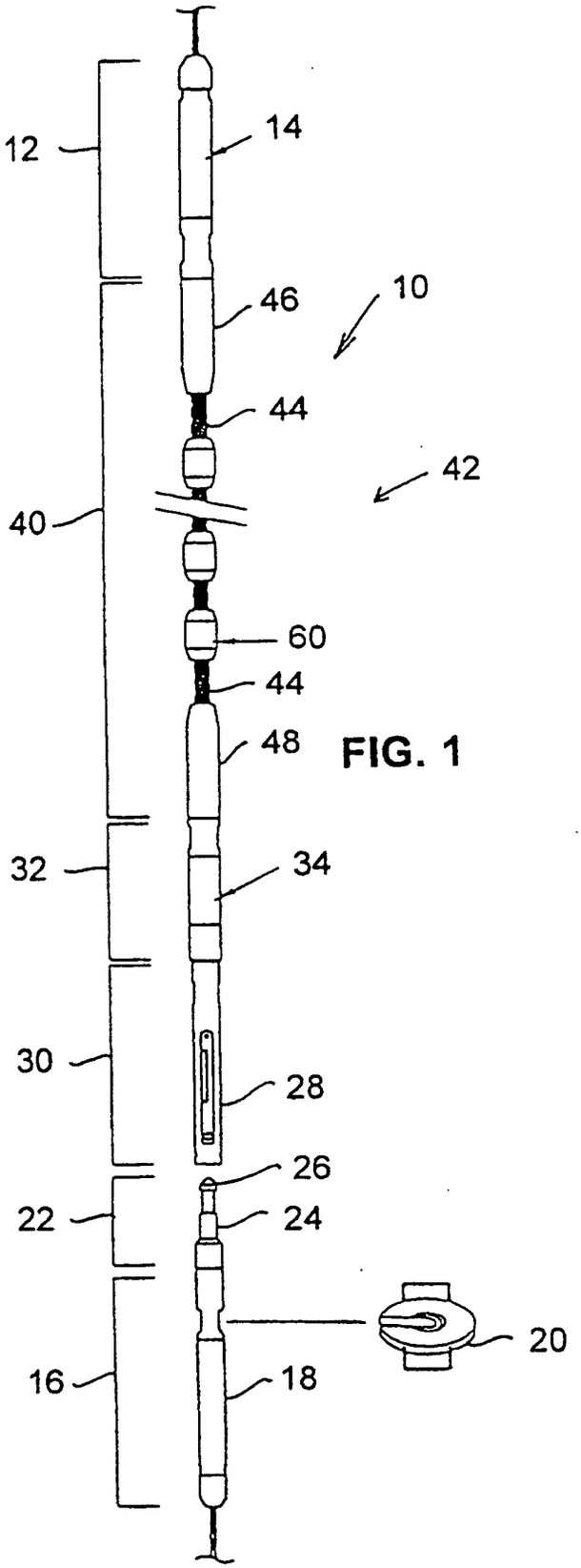

12
14
46
10
44
42
40
60
44
48
32
34
30
28
26
22
24
20
16
18

FIG. 1

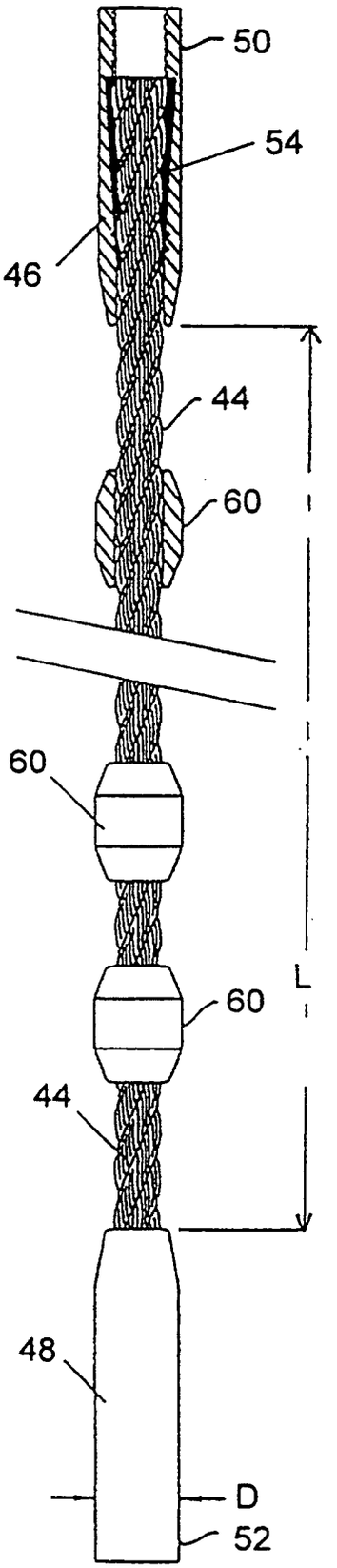

50
54
46
44
60
60
60
L
44
48
D
52

FIG. 2

FIG. 3

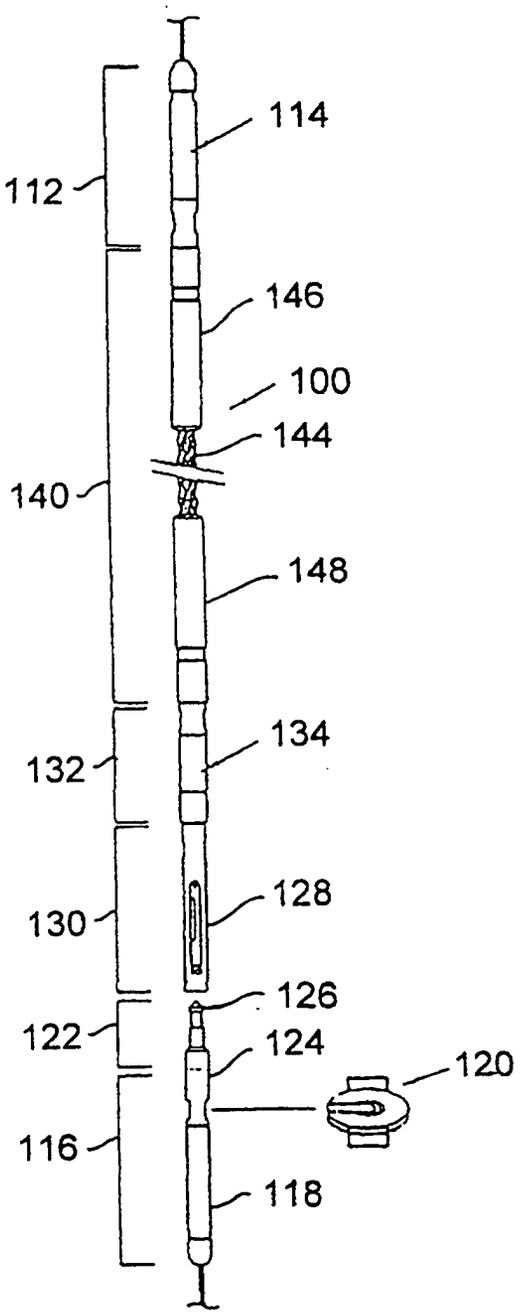
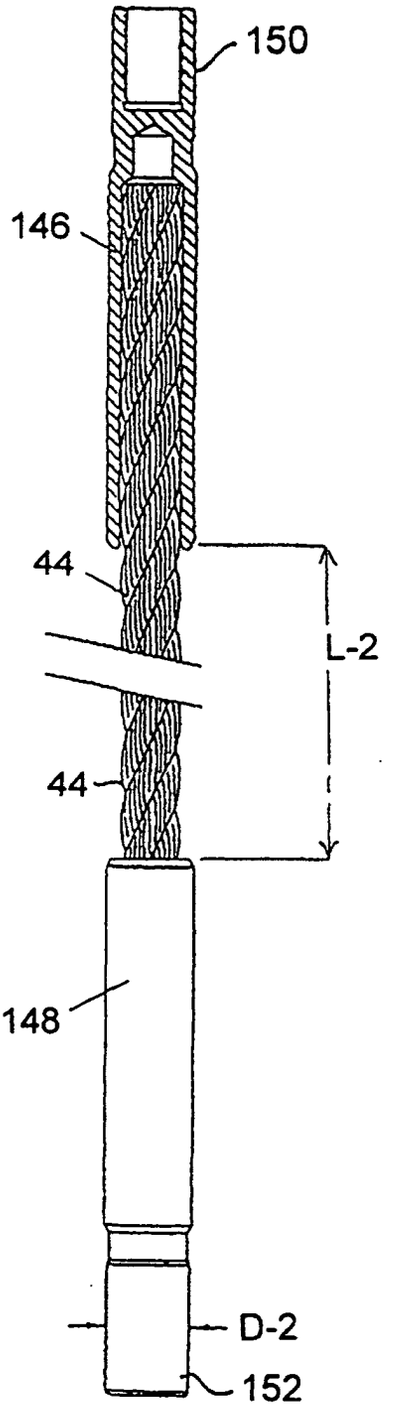

114
112
146
100
144
140
148
134
132
128
130
126
122
124
120
116
118

FIG. 4


150
146
44
L-2
44
148
D-2
152