Oct. 25, 1960 G. E. KEMNITZ 2,957,525

GUIDE ASSEMBLY FOR WASHOVER PIPE

Filed Feb. 11, 1957 2 Sheets-Sheet 1

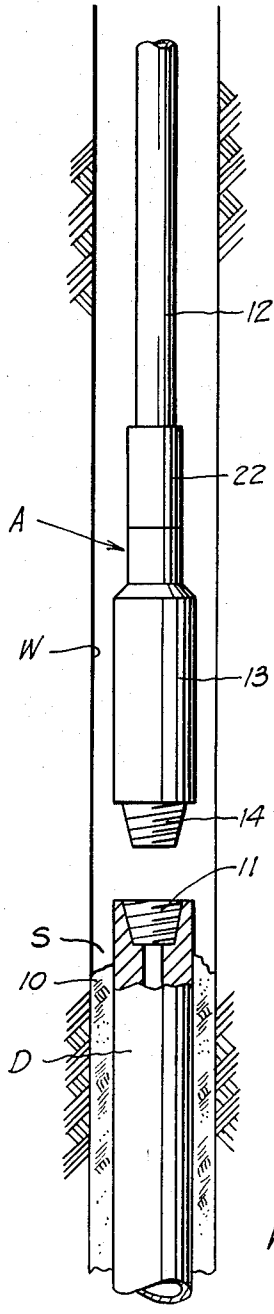


Fig. 1

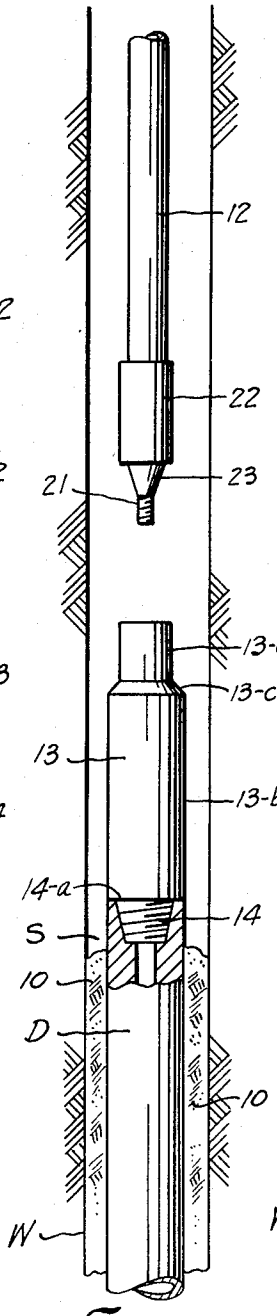


Fig. 2

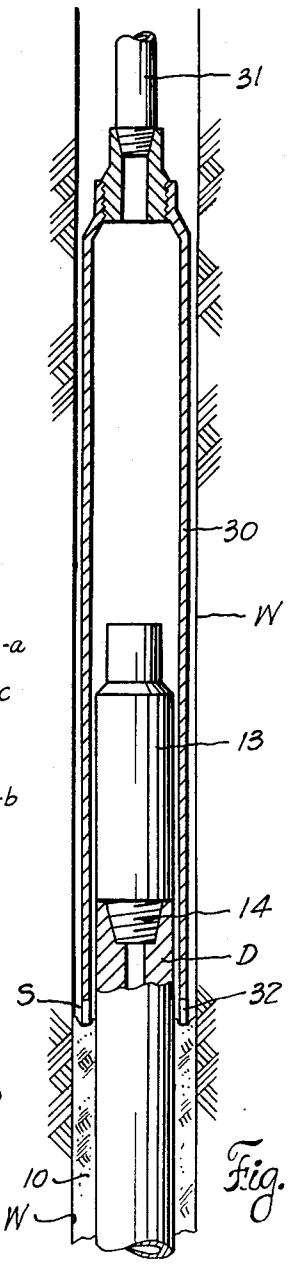


Fig. 3

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GUIDE ASSEMBLY FOR WASHOVER PIPE

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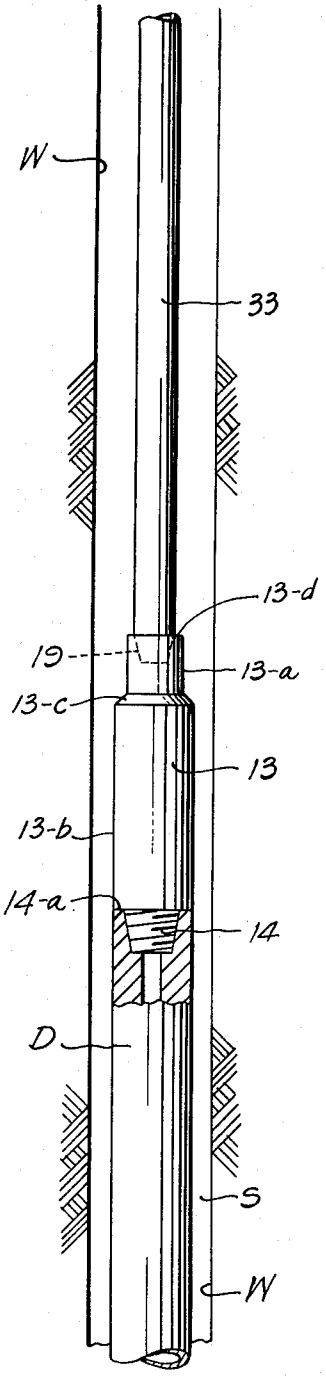
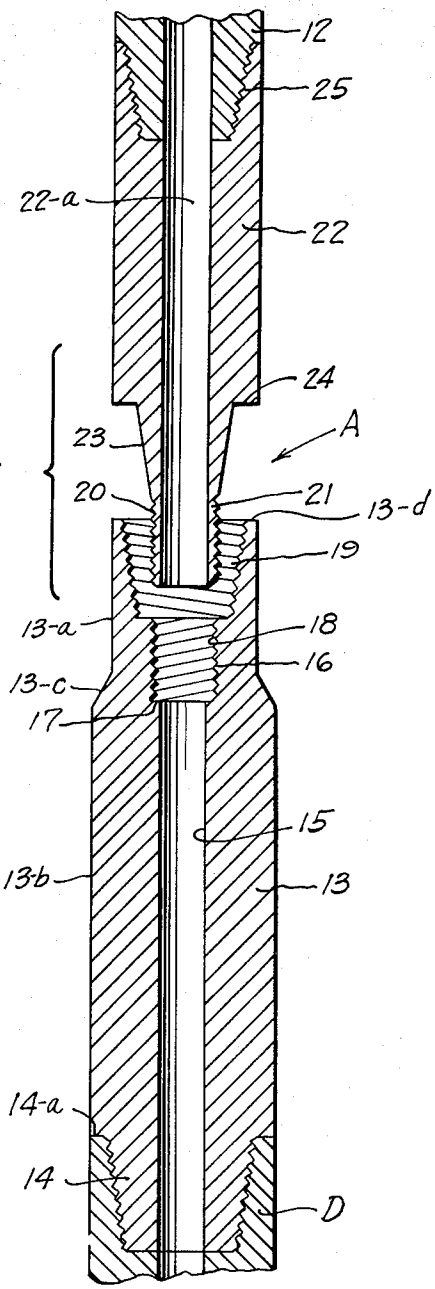


Fig. 4

Fig. 5



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GUIDE ASSEMBLY FOR WASHOVER PIPE

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3 Claims. (Cl. 166—221)

This invention relates to new and useful improvements in guide apparatus for washover operations.

When a drill collar or pipe becomes stuck within a well bore, it is the general practice to lower a washover pipe downwardly around the stuck element or fish to carry out a washover operation. The lower end of the washover pipe has a rotary shoe or cutting tool secured thereto and generally the washover pipe is rotated simultaneously with the circulation of the washing fluid, the rotary shoe functioning to cut out or drill any material or debris has lodged about the stuck element.

Where the stuck element is a large drill collar or a pipe having relatively small clearance with respect to the wall of the well bore, difficulty is experienced in locating the washover pipe in encircling relationship to the stuck element and in many instances, the rotation of the washover pipe results in the rotary shoe actually cutting the upper end of the stuck element. This damages the threaded connection, usually a box, at the upper end of the stuck element to the extent that it is impossible to subsequently make reconnection with a removing pipe string after the stuck element has been loosened. In the case of a drill collar, damage to one end thereof destroys the collar and as is well known, the usual drill collar is quite expensive.

It is, therefore, one object of this invention to provide an improved guide apparatus which may be readily connected to a stuck element, such as a drill collar or pipe, and which has means for guiding a subsequently lowered washover pipe into proper position encircling the stuck element, whereby efficient washover operations may be carried out even though there be small annular clearance between the stuck pipe and the wall of the well bore.

An important object is to provide a guide apparatus adapted to be connected to the upper end of a stuck element which not only guides the washover pipe into proper position, but also protects the upper end of the stuck element against any possible damage by reason of rotation of the usual rotary shoe.

Another object is to provide a guide apparatus consisting of an upper sub member and a lower sub member which are releasably connected to each other; said sub members being lowered into the well bore in connected position and being manipulated by means of the lowering pipe to first attach the lower sub member to the stuck element and to thereafter disconnect the sub members from each other, whereby the upper sub member may be removed from the well bore while the lower sub member remains attached to the stuck element and functions as a guide for guiding a washover pipe into proper position over the stuck element, said lower sub member having means at its upper end for subsequently attaching a removing pipe thereto, whereby the stuck element may be retrieved after it has been loosened by the washover operation.

The construction designed to carry out the invention

will be hereinafter described, together with other features thereof.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings forming a part thereof, wherein an example of the invention is shown, and wherein:

Figure 1 is a view illustrating a drill collar stuck within a well bore and showing the guide apparatus, constructed in accordance with the invention, being lowered downwardly through the well bore.

Figure 2 is a view similar to Figure 1 and showing the lower sub member of the guide apparatus in connected or attached position with the drill collar and illustrating the upper sub member of said apparatus being removed from the well bore.

Figure 3 is a similar view showing a washover pipe in position encircling the upper end of the stuck drill collar.

Figure 4 is a view similar to Figures 1 to 3 and showing a retrieving pipe connected with the lower sub member of the apparatus and illustrating the manner of removal of the drill collar after it has been loosened from its stuck position and

Figure 5 is a transverse vertical sectional view of the guide apparatus, constructed in accordance with this invention.

In the drawings the letter W indicates a well bore within which a drill collar D is illustrated as being stuck, with material or debris **10** surrounding the drill collar and maintaining it in its stuck position. The drill collar D has the usual threaded box **11** in its upper end which box was previously connected with a drill pipe, such drill pipe having been removed when the drill collar and the portion therebelow (not shown) became stuck in the well.

The guide apparatus of the present invention is generally indicated by the letter A and this apparatus is connected to the lower end of a lowering pipe **12**. Referring to Figure 5, the apparatus A includes a lower sub member or body **13**. The lower end of the body is formed with a threaded pin **14**, the external threads of which are adapted to fit the threaded box **11** of the drill collar D. A vertical circulation passage or bore **15** extends entirely through the member or body **13**.

At its upper portion, the bore or passage **15** of the body **13** is enlarged as indicated at **16** and this forms an internal annular shoulder **17** within the body. Threads **18** are formed within the portion **16** of the passage. Above the enlarged portion **16**, the bore or passage **15** of the body is further enlarged and is preferably tapered to form a threaded box **19**. The threads of the box **19** are preferably the usual connecting threads which will connect with the ordinary pin on drill pipe of a particular size. The threads **18**, which are formed within the enlarged portion **16** below the box **19**, are preferably left-hand threads and are adapted to be engaged by the threads **20** formed on a depending pin **21** at the lower end of an upper sub member **22**. Immediately above the threads **20**, the pin **21** is tapered as shown at **23**, and this tapered portion terminates in a shoulder **24**. The outer diameter of the upper sub member **22** is substantially equal to the external diameter **13**–*a* at the upper end of the body or lower sub member **13**. As is clearly shown in Figure 5, the external diameter of the portion **13**–*a* is smaller than the external diameter **13**–*b* of the main portion of the body **13**, these different diameter portions being connected by a taper or bevel section **13**–*c*.

In using the improved apparatus, the upper sub **22** is connected to the lower sub or body **13** by means of the

threads 20 on pin 21 engaging the threads 18 within the portion 16 of the bore of the body. As has been noted, this is a left-hand threaded connection. The location of the external shoulder 24 on the upper sub member 22 is such that when the threads 20 are made up with the threads 18, shoulder 24 abuts or engages the upper end 13–*d* of the body 13. This is the position of the parts as illustrated in Figure 1, and it is noted that at this time the tapered portion 23 of the pin 21 is disposed within the box 19, although, of course, it is not engaged with the threads of said box.

The upper sub member has a threaded box 25 to which is connected a lowering pipe 12, and the apparatus is thus lowered into the well bore in the manner shown in Figure 1. Upon the engagement of the threaded pin 14 on the lower sub member or body 13 with the threaded box 11 of the drill collar D, the lowering pipe 12 is rotated in a direction to the right to make up the pin 14 into the box 11. In this regard it is noted that when the left-hand threads 18 and 20 are connected, they are made up relatively tight, so that a right-hand rotation of the lowering pipe will result in a connection of the pin 14 to the box 11 before there is any breaking out or disconnection of threads 18 and 20. After the lower sub member or body 13 is connected to the drill collar D, continued rotation to the right will break out the threads 18 and 20 and will disconnect the upper sub member 22 from the body 13. Thereafter, the lowering pipe 12 may be lifted upwardly in the manner illustrated in Figure 2 and the lowering pipe, together with the upper sub member 22, may be removed from the well bore. This leaves the lower sub member or body 13 having its upper end reduced at 13–*a*, located in attached position in the well bore. It is pointed out that the major portion of the body 13 has its diameter 13–*b* substantially equal to the external diameter of the drill collar. Thus, an external shoulder 14–*a* formed on the body 13 just above the pin 14 will engage the upper end of the drill collar D and will thereby protect and completely cover such upper end.

After the lowering pipe and the upper sub member 22 have been removed from the well bore, a washover pipe 30 may be lowered by means of a suitable lowering pipe 31. This washover pipe normally has a rotary shoe 32 secured thereto and, as is well known, it is necessary that the washover pipe encircle the drill collar, moving downwardly through the annular space S between the exterior of the drill collar and the wall of the well. Since the upper portion 13–*a* of the body 13 is of substantially less diameter than the diameter of the drill collar D, it is evident that as the wash pipe 30 is lowered, it will be guided over the reduced portion 13–*a* very readily. This portion 13–*a* of the body 13 then functions to center the washover pipe and to guide said pipe downwardly along the inclined portion 13–*c* and in encircling relationship to the main portion 13–*b* of the body 13. The washover pipe is thus readily guided into proper encircling relationship with respect to the upper end of the drill collar and upon the subsequent rotation of the washover pipe, the rotary shoe will properly drill out the material or debris 10 which is holding the drill collar in stuck position. It is evident that, not only does the body 13 guide the washover pipe into proper position around the drill collar, but at the same time said body fully covers and protects the upper end of the drill collar from any damage by rotation of the rotary shoe, as might be the case if it is attempted to place the washover pipe directly over the drill collar.

After the washover operation is complete, it is only necessary to remove the washover pipe and to then lower a retrieving pipe 33, and connect the lower end of said retrieving pipe into the threaded box 19 at the upper end of the body 13, in the manner illustrated in Figure 4. When this is done, the retrieving pipe 33 may be utilized to remove the loosened drill collar D from the well bore. Upon reaching the surface, the body 13 is, of course, disconnected from the drill collar and is reconnected to the upper sub member 22 so as to be ready for a subsequent operation.

From the foregoing it will be seen that a simple apparatus is provided which may be readily lowered into the well bore and attached to a stuck element or fish, after which a portion of the apparatus is removed so as to expose a connection, such as the threaded box 19, whereby a retrieving pipe may be subsequently connected thereto in order to remove the device and the stuck element from the well bore. It has been found that the left-hand connection between threads 20 on the pin 21 and the threads 18 is a satisfactory way of releasably connecting the upper sub member 22 to the body 13. However, it is pointed out that other types of releasable connections could be employed. For example, a well known J-slot and a pin connection could be made between the parts. Such a J-slot and pin connection would releasably secure the upper sub member 22 to the body 13 and would permit rotation of the body 13 in order to connect its pin 14 with the drill collar; yet at the same time, it would be possible, after the connection is made, to uncouple the upper sub member 22 from the body 13, whereby said body would remain in the well bore to guide the washover pipe into proper encircling relationship to the stuck element.

The particular proportions and sizes of the various parts of the apparatus are, of course, subject to some variation. For example, the reduced guide section or portion 13–*a* of the body could be increased in length over that illustrated and also the longitudinal extent of the tapered portion 13–*c* could be increased and its taper made more gradual than that shown. It is preferable that the lower portion of the body 13 at the shoulder 14–*a* have substantially the same diameter as the drill collar or the stuck element, so as to protect the upper end thereof although it could be slightly smaller and still accomplish the purpose. If desired, the external diameter of the body could be gradually tapered from shoulder 14–*a* to its upper end 13–*d* so that the body would, in effect, be tapered from end to end and such arrangement would produce a satisfactory guiding of the washover pipe into proper relationship to the drill collar. It is noted that the upper sub member 22 is also formed with the bore or passage 22–*a*, which extends completely therethrough so that circulation completely through the apparatus may be maintained as the same is being lowered downwardly into the well bore and during the time that the connection of the pin 14 is made with the drill collar.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the spirit of the invention.

What I claim is:

1. A well apparatus adapted to coact with a tubular stuck element within a well bore wherein the stuck element has a threaded box in its upper end, said apparatus including, an elongate tubular body having a threaded pin at its lower end for connection with the box of the stuck element, a reduced external guide portion formed at the upper end of the body and having an internally threaded box for receiving a retrieving pipe, an upper sub member having its upper end attached to a lowering pipe, and means for releasably connecting said upper sub member to the tubular body, whereby said member and body may be lowered into the well bore as a unit and the body attached to the stuck element after which the upper sub member may be disconnected from said body and removed from the well by means of the lowering pipe.

2. A well apparatus as set forth in claim 1, wherein both the body and the upper sub member have fluid passages extending axially therethrough.

3. A well apparatus as set forth in claim 1, wherein the means for releasably connecting the upper sub member to the body comprises internal left-hand threads formed with the body below the threaded box and an external left-hand threaded pin formed on the lower end of the upper sub member.

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