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Sharp, Jr.

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[54] **UNDERWATER ANCHOR STRUCTURE AND METHOD OF SETTING SAME**

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[52] **U.S. Cl.** **61/46**, 114/206, 166/.5

[51] **Int. Cl.** **B63b 21/00**, E02d 5/54, E21b 7/12

[58] **Field of Search** ..... 61/46, 46.5; 175/7, 175/8, 9, 5; 166/.5, .6; 114/206

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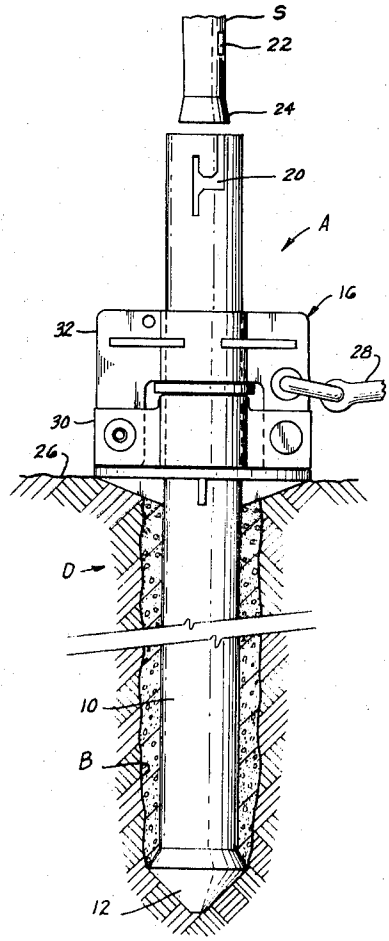
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[57] **ABSTRACT**

An underwater anchor structure having a tubular body, a drill bit secured to the lower end of the body, a stop plate secured to the exterior of the body, means for releasably connecting the upper end of the body to a drill string and a swivel joint rotatably mounted around the body above the stop plate, part of the joint being releasably connected to said body and the method of setting such underwater anchor structure including the steps of drilling a well bore underwater with the anchor structure attached to a drill string, flowing cement through the drill string and the anchor structure into the well bore, releasing the drill string from the anchor structure and recovering the drill string while leaving the anchor structure cemented in the well bore; this abstract is neither intended to define the invention of the application which, of course, is measured by the claim, nor is it intended to be limiting as to the scope of the invention in any way.

4 Claims, 4 Drawing Figures



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SHEET 1 OF 2

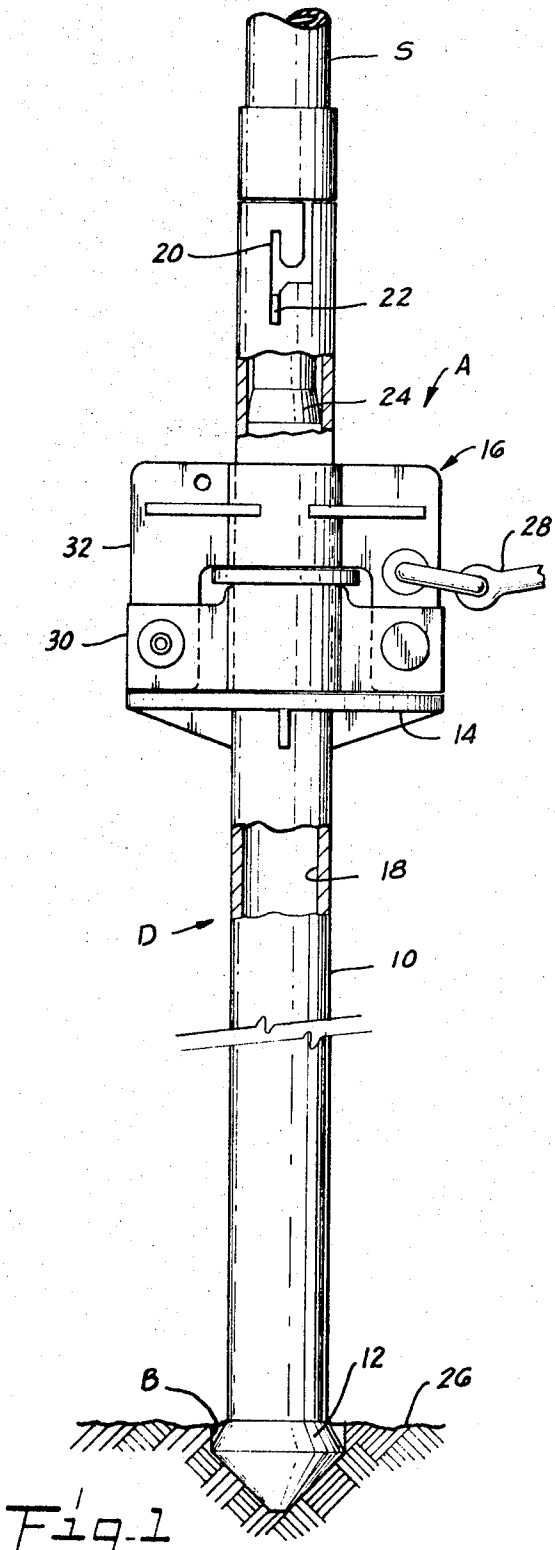


Fig. 1

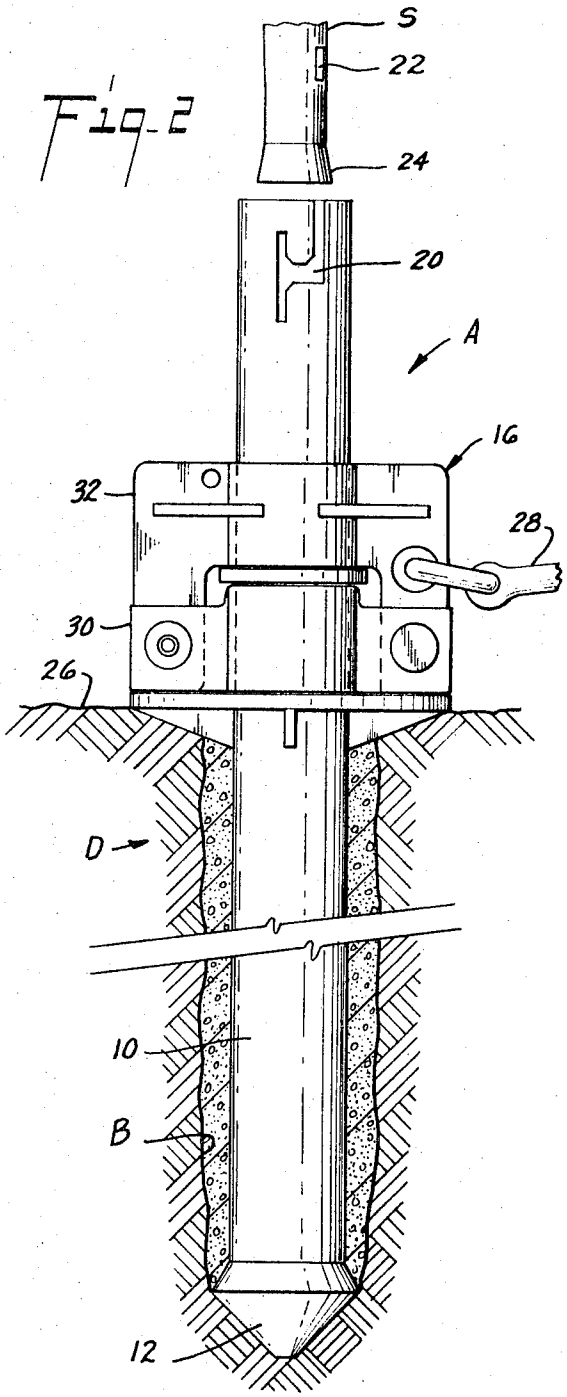
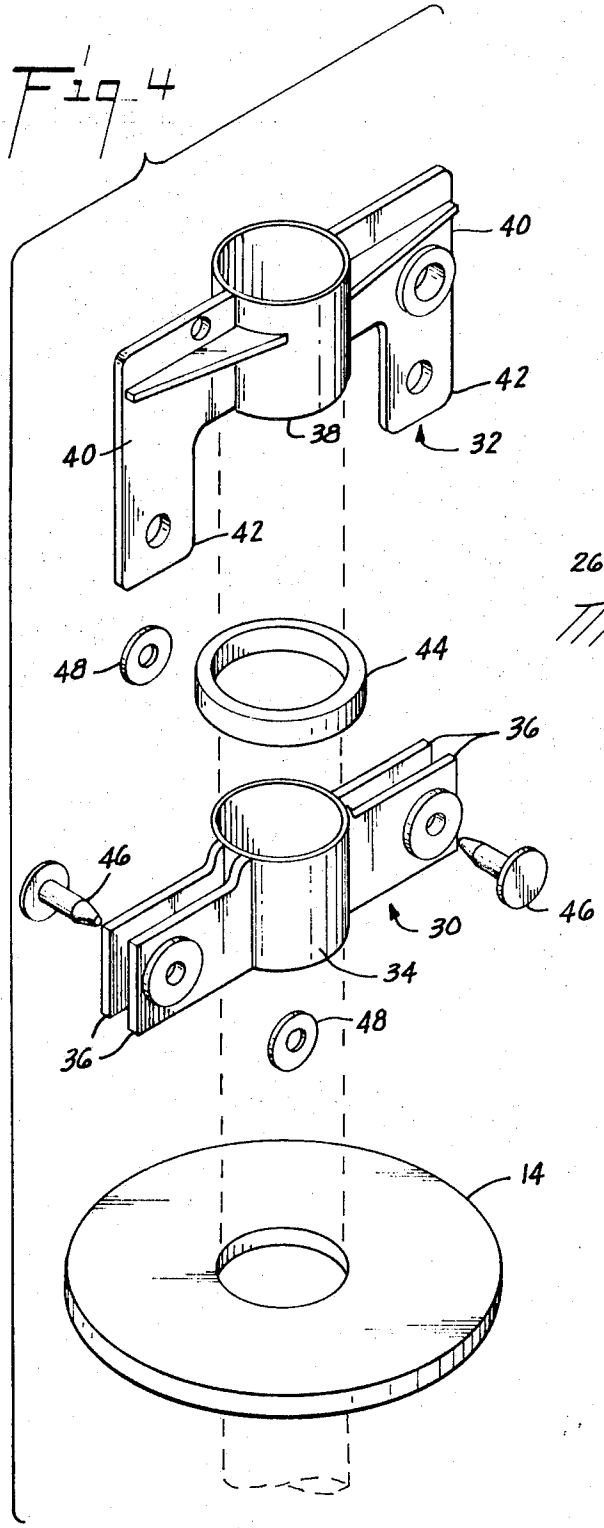


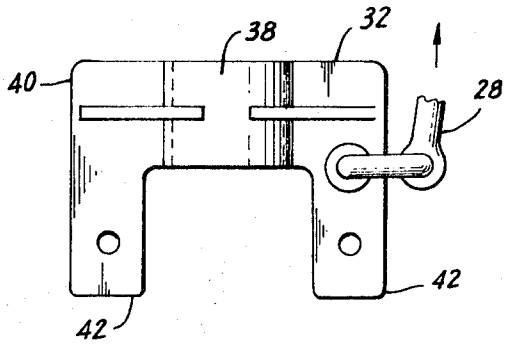
Fig. 2

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Fig. 4





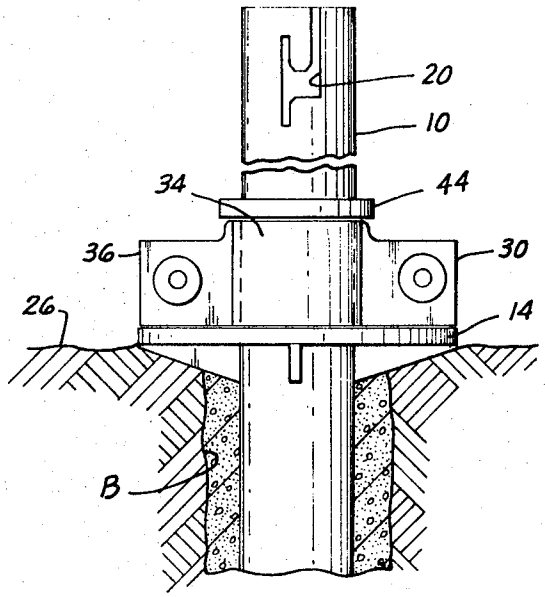


Fig. 3

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UNDERWATER ANCHOR STRUCTURE AND METHOD OF SETTING SAME

SUMMARY

The present invention relates to an improved underwater anchor structure and the method of setting such structure.

An object of the present invention is to provide an improved underwater anchor structure which is easy to set.

A further object of the present invention is to provide an improved underwater anchor structure which coacts with a drill string to drill the well bore in which it is to be set.

Another object is to provide an improved underwater anchor structure from which a cable which is rotatably mounted thereon can be released.

Still another object is to provide an improved method of setting an underwater anchor in which the well bore in which the anchor is to be set is drilled by the anchor and by a drill string to which it is releasably secured.

Still a further object is to provide an improved method of setting an underwater anchor with a drill string so that the drill string is easily and quickly recovered.

A still further object of the present invention is to provide an improved method of setting an underwater anchor in a minimum of time with substantially all equipment being recoverable therefrom.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the present invention are hereinafter set forth and more fully explained with respect to the drawings wherein:

FIG. 1 is a view of the anchor structure of the present invention as the underwater well bore drilling is commenced.

FIG. 2 is another view illustrating the anchor structure of the present invention cemented in the underwater well bore and with the drill string released therefrom and being recovered.

FIG. 3 is a partial view of the anchor structure and illustrating the recovery of the anchor cable and the releasable portion of the swivel joint.

FIG. 4 is an exploded view of the swivel joint and the stop plate with the tubular body position being indicated in dashed lines.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 the improved anchor structure, indicated generally at A, is shown connected to the drill string D not indicated to illustrate the start of drilling of the underwater well bore B. The anchor structure includes the tubular body 10, having the drill bit 12 secured to its lower end, a stop plate 14 secured as by welding or other suitable means around the exterior of the tubular body 10, the swivel joint 16 mounted on said tubular body 10 above said stop plate 14, means on the upper end of body 10 for releasably connecting the upper end of body 10 to the drill string S and means for connecting an anchor cable to said swivel joint 16.

The tubular body 10 has a central bore 18 extending therethrough to circulate drilling fluid and cement downwardly from the drill string S to the drill bit 12. The releasable connecting means between said drill string S and said body 10 is shown to be a J slot 20 having one leg opening upwardly so that the drill string S having a lug 22 on its exterior may be connected into a tubular body 10. Normally such connecting means will include a pair of lugs 22 on opposite sides of the drill string S which engage in the two J slots 20 in the upper end of tubular body 10. To assure circulation of drilling fluid and cement downwardly through tubular body 10 the lower end of drill string S includes a suitable seal 24 which is adopted to seal against the bore 18 of body 10.

As shown in FIG. 1 the anchor structure A is connected to the lower end of the drill string S, lowered in the water to bottom 26 and the combined string is rotated while circulating drilling fluid to drill the well bore B. Drilling is continued until the stop plate 14 engages the bottom 26. Stop plate 14 is therefore secured around tubular body 10 above drill bit 12 a distance which provides desired depth of well bore B.

When the drilling is completed, cement is pumped down through drill string S, tubular body 10 and drill bit 12 to fill the well bore B around the anchor structure as shown in FIG. 2. With the cementing completed the drill string is manipulated to release it from body 10 and then the drill string is recovered. This leaves the anchor structure A set in the bottom with cable 28 which is connected to the swivel joint 16 extending to the surface.

Swivel joint 16 is rotatably mounted on the exterior of tubular body 10 so that cable 28 does not become fouled with the anchor structure A or drill string S. The details of structure of swivel joint 16 are best seen in FIGS. 3 and 4.

Swivel joint 16 includes two components, 30 and 32, both of which surround tubular body 10 above stop plate 14, the means for retaining the component 30 on the body 10 and the means for releasably connecting the two components. The component 30 is positioned around body 10 above stop plate 14 and includes the sleeve 34 having spaced-apart parallel arms 36 extending from opposite sides of the sleeve 34. The component 32 includes the sleeve 38 and the opposed arms 40 having depending outer portions 42 adapted to be positioned between the arms 36 of component 30 when swivel joint 16 is assembled. Sleeves 34 and 38 have bores larger than the diameter of tubular body 10 so that swivel joint 16 is freely rotatable about tubular body 10.

The means for retaining component 30 to body 10 is the ring 44 which is suitably secured to body 10 as by welding. Ring 44 is positioned a sufficient distance above stop plate 14 to allow component 30 to rotate freely around body 10. The means for connecting component 30 to component 32 is shown to be the pins 46 and the fasteners 48. Pins 46 extend through aligned holes in the components 30 and 32 and are secured in such position by fasteners 48 so that they may be released to allow recovery of the component 32 and the cable 28 as shown in FIG. 4 when the anchor is no longer in use.

From the foregoing it can be seen that the improved underwater anchor structure of the present invention can be used as a part of the drill string to drill the well bore in which it is to be set and provides for the quick and easy recovery of the drill string after the anchor structure is set and for the recovery of the cable and part of the cable swivel joint when the anchor structure is to be abandoned. The anchor structure is also simple

and relatively inexpensive. The improved method of setting an underwater anchor structure is simple and quick. It requires neither the sacrifice of any drill pipe joints nor the simultaneous manipulation of a drill string and a separate anchor structure.

What is claimed is:

1. An underwater anchor structure comprising,
a tubular body,
drilling means secured to an integral width the lower end of said tubular body,
means for releasably connecting a drill string to the upper end of said tubular body,
means for releasably connecting a cable to said tubular body whereby when the tubular body is set in an underwater well bore said cable can be used to anchor a structure with respect to said tubular body and when desired may be recovered therefrom,
said cable connecting means including
a swivel joint pivotally mounted around said tubular body,
said swivel joint including a first sleeve component rotatably retained on said tubular body and a second sleeve having an anchor cable releasably attached thereto,
said first sleeve having opposite arms extending outwardly therefrom,
said second sleeve having opposite arms extending outwardly therefrom, and
fastening means for releasably connecting the arms of said sleeves.

2. An underwater anchor structure according to claim 1 wherein
a portion of the arms of said first and second components overlap, and
said fastening means extend through aligned holes in the overlapping portions of said arms.

3. An underwater anchor structure according to claim 1 wherein
said first component includes opposed pairs of spaced apart arms,
said second component includes opposed arms each having depending portions extending between the respective pairs of the arms of said first component.

4. An underwater anchor structure comprising,
a tubular body,
a drill bit secured to the lower end of said tubular body,
said tubular body being adapted to have cement flow therethrough for cementing the tubular body in an underwater bore drilled by said drill bit,
a stop plate secured around the exterior of said tubular body at a position spaced from said drill bit the desired depth of bore to be drilled,
means for releasably connecting a drill string to the upper end of said tubular body,
a swivel joint having two components, means for releasably securing said two components together, means for rotatably mounting one of said components to said tubular body above said stop plate, the other of said components thereby being releasable from said tubular body, and
a cable connected to said component of said swivel joint which is releasable from said tubular body.

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