Sept. 22, 1970 R. T. G. TITMAN 3,529,427

DEVICE FOR PREVENTING OR REDUCING SCOURS AT THE LOWER ENDS OF MEMBERS SUPPORTING MARINE STRUCTURES

Filed Nov. 5, 1968 3 Sheets-Sheet 1

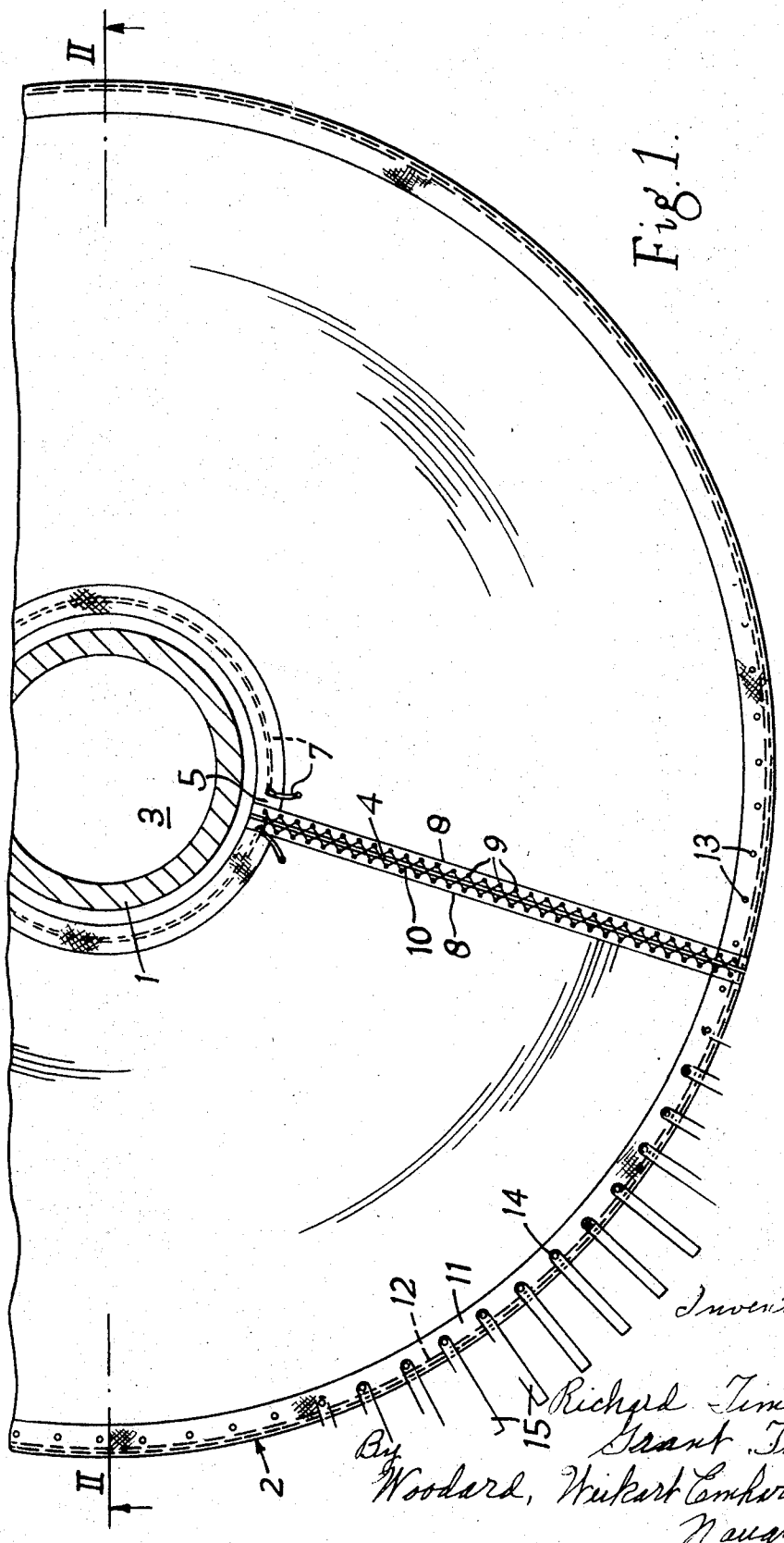


Fig. 1.

Inventor
Richard Timothy Grant Titman
By Woodard, Weikart Emhardt & Naughton
attorneys

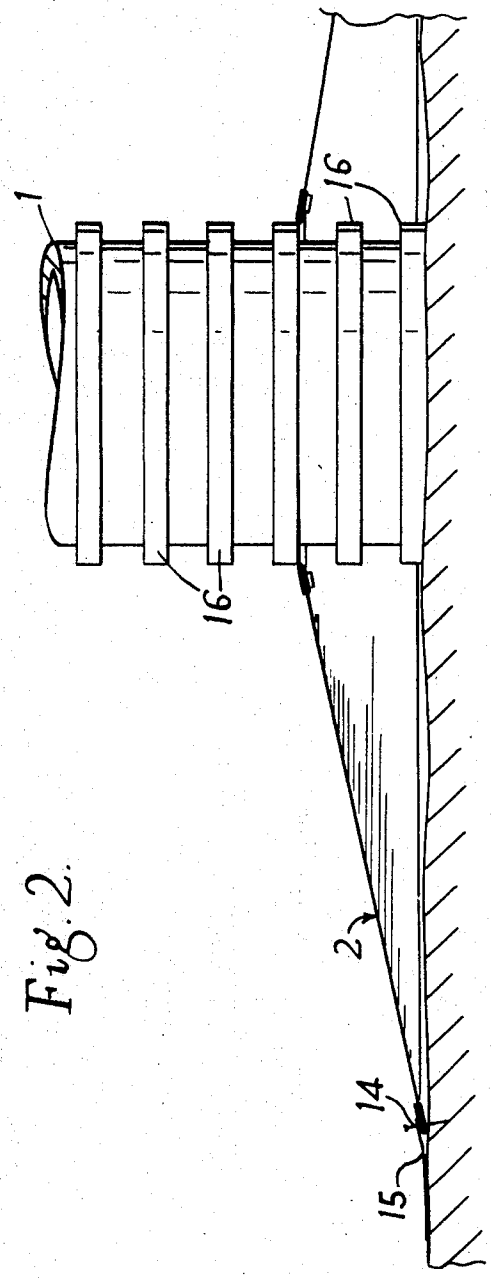


Fig. 2.

INVENTOR
RICHARD TIMOTHY GRANT TITMAN

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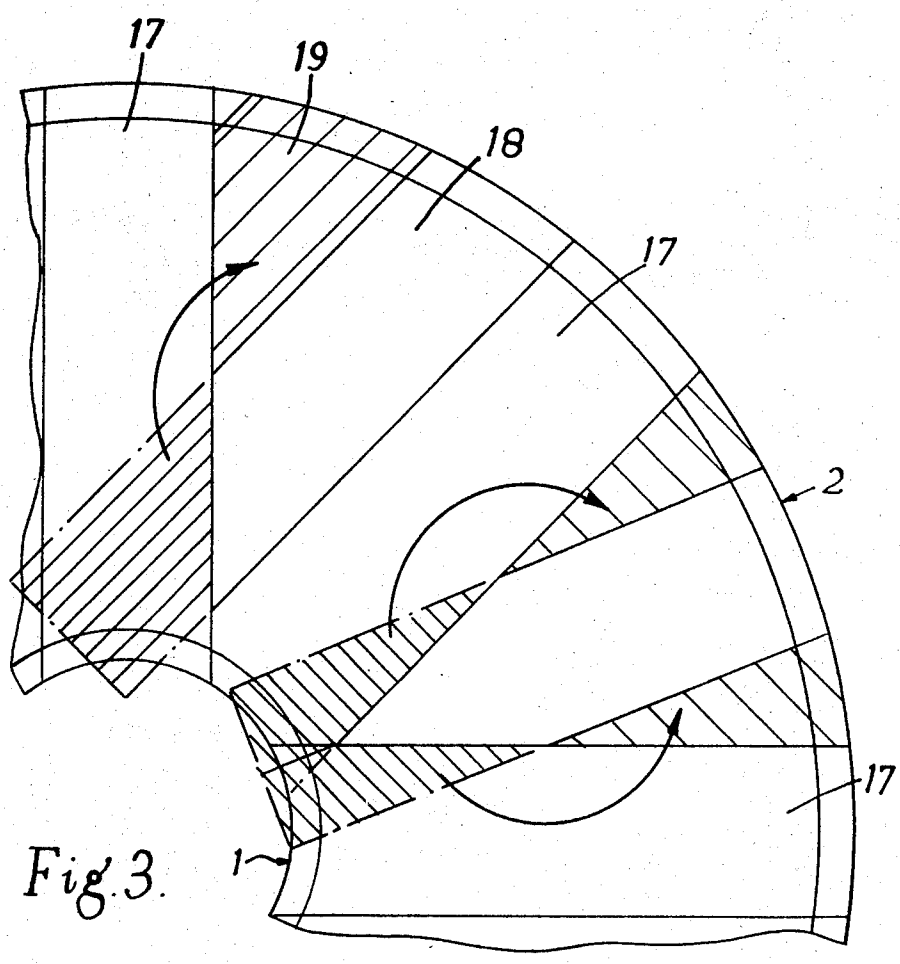


Fig. 3.

Inventor
Richard Timothy Grant Titman
By
Woodard, Weikart, Emhardt & Naughton
attorneys

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DEVICE FOR PREVENTING OR REDUCING SCOURS AT THE LOWER ENDS OF MEMBERS SUPPORTING MARINE STRUCTURES

Richard T. G. Titman, London, England, assignor to Delta Diving Limited, London, England, a British company

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U.S. Cl. 61—46 7 Claims

ABSTRACT OF THE DISCLOSURE

This invention provides a device for preventing scours at the lower ends of members supporting a marine structure, for example an oil rig. The device comprises a reticulated or perforated collar which encircles the lower end of each member at the sea bed, the collar being secured to the member and having its outer margin anchored to the sea bed. The arrangement is such that the device prevents sand at the sea bed being washed away from the member by tidal movements, but allows the sea water to pass through the collar.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to a device for preventing or reducing scours at the lower ends of members supporting marine structures.

It has been found that, where an oil rig is supported on legs which extend into a sand strata at the sea bed, the tidal flow of the water causes scours or cavities to be formed at two opposite sides of the legs where the legs enter the sand, the sides being those in the direction of the tidal flow. Such tidal disturbance of the water has been known to produce scours about 14 ft. deep. As will be apparent, the formation of scours may be the primary cause of a rig collapsing due to one or more of its legs shifting and bending under the weight of the rig.

An advantage of the device is that it prevents the formation of scours at, or adjacent, the supporting members of a marine structure, more especially an oil rig, thereby eliminating the possibility of the collapse of the structure.

SUMMARY OF THE INVENTION

Describe briefly, a typical embodiment of the present invention comprises a reticulated or perforated collar which encircles each leg of an oil rig, the collar being fixed to the leg and having its outer margin anchored to the sea bed so that displacement of the collar relatively to the leg and sea bed is prevented. The collar prevents the formation of scours in the sea bed, but allows the flow of water therethrough.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan of one half of a device in accordance with the invention;

FIG. 2 is a section on line II—II of FIG. 1, a leg to which the device is attached being shown in elevation and

FIG. 3 is a plan, drawn to an enlarged scale, of a sector of the device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the invention will now be described, by way of example as applied to one of the legs of an oil rig. Referring to FIGS 1 and 2, the leg **1** is circular

in cross section and is tubular, but in some instances, the leg may be of a shape other than circular in cross section. Fitted to the leg **1** is a circular collar **2** about 28 ft. in diamter, but this dimension may be varied according to requirement. The collar is formed from a meshed sheet material which is not adversely affected by sea water, for example a plastic such as polypropylene.

The collar has a central hole **3**, through which the leg extends, and a radial cut **4** which enables the collar to be opened out so that it can be placed around the leg. The hole **3** has a hem **5** of canvas or any other suitable material and within the hem is a nylon rope **7** which serves as a drawstring whereby the collar can be secured to the leg.

The edges of the collar at the radial cut also have canvas hems **8** which are sewn or otherwise secured to the collar. Equally spaced along each hem are eyelets **9** of a non-corrosive metal through which a lace **10** is threaded so that the edges can be drawn together.

The outer peripheral edge of the collar also has a hem **11** which is wider than the other hems. Sewn or otherwise secured in the hem is a nylon rope **12** for strengthening the hem. Spaced about 1 ft. apart around the hem are eyelets **13** of a non-corrosive metal through which eyelets pins **14** each about 1 ft. 6 in. long and ½ in. diameter, are inserted to anchor the hem to the sea bed. Any other means may be provided for anchoring the outer margin of the collar to the sea bed. For example, a ring of non-corrosive metal may be fixed to the outer hem, the ring being of sufficient weight, or weighted, in order to retain the hem on the sea bed.

In the instance where the hem is anchored by pins, these may cause scours in the region of the pins **14**. In order to prevent this happening, tapes **15** may be fixed to the pins which tapes extend radially and outwardly from the collar. The tapes lie on the sea bed and prevent the sand being washed away from the pins.

The collar may rest flat on the sea bed or its inner part may be raised so that the collar is conical in shape. This may be achieved by tying the draw rope or string of the collar between any selected two of rings **16** normally provided on the legs for jacking purposes.

Since the collar is of considerable area, making it difficult, if not impossible, to obtain meshed material of adequate size to permit the collar being made in one piece, it may be composed of panels **17**, of the material as shown in FIG. 3, the panels being sewn together. Conveniently, the surplus material, indicated by cross hatching of panels **18** may be used to fill a triangular space **19** between the panels **17** and **18**.

It is to be understood that the collar need not necessarily be circular in shape, and may be square, triangular or any other shape in order to correspond to the cross sectional shape of a leg.

The effect of the device is that sand disturbed by tidal flow is confined by the collar and, due to the mesh, the device offers little or no obstacle to the flow of the water. Thus, there is no tendency for the device to be displaced by the flow.

Although it is prefered to use meshed material for the collar, sheet material having a multiplicity of holes or apertures could be used, providing that the sum total of the area of the holes or apertures is adequate to permit free flow of the water through the collar.

The invention claimed is.

1. A device for preventing or reducing scours in the sea bed at the lower end of a member supporting a marine structure, comprising: a perforated sheet encircling the member, said sheet being made of a water permeable but sand impermeable material; and securing means for preventing displacement of the sheet relative to the member and the sea bed.

2. A device as set forth in claim 1, comprising;

a collar of perforated material encircling the aforesaid member and having a hole through which the member extends;

a drawstring surrounding the said hole for drawing the collar to the said member and anchoring means at the outer margin of the collar for anchoring the collar to the sea bed; the said device preventing sand at the sea bed from being washed away from the said member by tidal movements but allowing the sea water to flow through the collar.

3. A device as set forth in claim 2, wherein the aforesaid collar has a radial cut extending to the aforesaid hole to enable the collar to be opened out and positioned around the aforesaid member and means adjacent the edges of the cut for securing the edges together.

4. A device as set forth in claim 3, wherein the aforesaid means comprise eyelets positioned adjacent the aforesaid edge through which eyelets a lace is threaded.

5. A device as set forth in claim 2, wherein the aforesaid means for anchoring the outer margin of the aforesaid

collar comprise pins which are driven into the sea bed through eyelets in the said margin.

6. A device as set forth in claim 2, wherein the aforesaid outer margin is weighted so that the said margin is maintained in position on the sea bed.

7. A device as set forth in claim 1, including means for securing a central portion of the aforesaid sheet to the aforesaid member above the sea bed so that the said sheet can assume a substantially conical shape when in position on the sea bed.

References Cited

UNITED STATES PATENTS

2,940,266	6/1960	Smith	61—46.5
3,312,069	4/1967	Jorda	61—1
3,394,553	7/1968	Vidal	61—46.5
3,453,830	7/1969	Mitchell	61—46.5

J. KARL BELL, Primary Examiner

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61—1, 52