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## (54) A COLLAPSIBLE ANCHOR

(71) I, ARVID ISAKSSON, of N—  
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 a subject of the King of Sweden, do hereby  
 declare the invention, for which I pray that a  
 patent may be granted to me, and the method  
 by which it is to be performed, to be par-  
 ticularly described in and by the following  
 statement:—

The present invention relates to a collapsible anchor.

According to the present invention there is provided a collapsible anchor comprising two shanks, each provided with a fluke extending laterally of the shank, the shanks being pivotably interconnected by a bolt which passes through holes in end portions of the shanks, one of the end portions engaging an abutment on the bolt and the other end portion being engaged by a compressed resilient element disposed between that other end portion and a further abutment on the bolt, each end portion being inclined to the main portion of the respective shank, and the end portion of one of the shanks engaging the other shank in such a way as to prevent relative pivotal movement of the shanks out of an operative position in which the shanks are inclined to one another, the end portions being tiltable away from each other by compressing the resilient element to move the end portion of the said one of the shanks out of engagement with the said other shank to allow the shanks to be folded together into an inoperative position.

For a better understanding of the present invention and to show how it may be carried into effect, reference will now be made, by way of example only, to the accompanying drawings, in which:

Figure 1 shows a collapsible anchor in an operative position on the sea bed;

Figure 2 is a front elevation of the anchor of Figure 1;

Figure 3 is a side elevation of the anchor of Figures 1 and 2;

Figure 4 shows the anchor of Figures 1 to 3 in a collapsed, inoperative position;

Figures 5 and 6 show, on a larger scale and in partial section, two views of part of the

anchor of Figures 1 to 4 in the operative position; and

Figures 7 and 8 correspond to Figures 5 and 6 but show the anchor during collapsing into the inoperative position.

The anchor shown in the drawings comprises two parts or halves 1 and 1'. Each part comprises an anchor shank 2 and 2', respectively, and a fluke 3, 3', respectively. At the end of each shank away from the fluke, there is an inclined end portion 4 and 4', respectively. An eyebolt 6 extends through holes 5 and 5', respectively, in the above-mentioned end portions. The function of these fittings will be described in greater detail below.

Since both of the parts 1 and 1' are substantially identical, only one part will be described in detail.

In the part 1, the shank 2 consists of a rectangular-section steel rod or the like the main portion of which is straight and which, at its upper end 4, is bent and provided with the hole 5. The fluke 3 is fixed at the other, end 8 of the shank. The fluke consists of a slightly arched plate of relatively thick sheet metal and is—apart from a portion 9 which is located on a level with the joint line between shank and fluke—substantially triangular. It should, however, be noted that the apex of the triangle is offset so that it lies adjacent a plane passing through the shank. The point or bill 10 of the fluke 3, which thus corresponds to the apex of the triangle, is very sharp as compared with the bills of conventional anchors. The edge portions 11 and 12 of the fluke which are to bury themselves in the sea bed are designed as cutting edges in that the edges at the side of the fluke 3 facing out from the shackle end of the shank are bevelled.

The function of the folded-out anchor is apparent from Figures 1, 2 and 3. In Figure 1, the anchor is seen lying on the sea bed B before the anchor line has been tightened. It is apparent from this Figure that one fluke 3 rests with its point 10 on the sea bed, whilst the rear edge of the other fluke 3' and the upper ends of the shanks 2, 2' rest against

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the sea bed. As soon as the anchor line is tightened, the point 10 will bury itself in the sea bed.

In Figure 1, the sea bed is indicated by the line B and the direction of the anchor line is shown by the line D. It is clearly apparent from this drawing that if the line is pulled in the direction D that the fluke will bury itself in the direction Y.

The reason why the position of the apex of the triangle or the point 10 is offset in towards the plane in which the shank 2 lies is apparent from the drawings. Since the anchor, or in any event the operative fluke 3 lies, in the initial position, inclined in relation to the bed B, the point should be laterally offset in order to realize an even loading of the fluke so that it strives to cut through the bed material when the line is tightened and the shank 2 will be aligned with the line.

When engagement with the bed material has been established, that is to say when the fluke 3 has cut down into the bed material, the inoperative part 1' of the anchor (that is to say the shank 2' and the fluke 3') does not participate directly in the retention function, serving merely as a stabilizer.

A substantial advantage in the illustrated anchor is that, irrespective of how the anchor is turned when it reaches the bottom, one fluke will always be positioned so that its point can bury itself in the sea bed. If the anchor lies such that the eyebolt faces in the wrong direction, the anchor will tip over or turn about the downwardly facing fluke as soon as the anchor line is tightened.

The previously mentioned inclined end portions 4 and 4' at the upper ends of the shanks are equidistant from the fluke on each respective shank. Because, as is shown in the drawings, the portions 4 and 4' abut against each other, one anchor part will be slightly offset relative to the other half. This means that the anchor parts can be totally collapsed in on each other so that, as is apparent from Figure 4, the fluke 3 will lie above the fluke 3' and the shanks will be closely adjacent one another.

The locking mechanism for the anchor parts, in which are included the inclined portions 4 and 4', the eye bolt 6 and the holes 5 and 5' therefor, is constructed and functions in the following manner.

At the inclined end portion 4 provided on the one shank 2, the hole 5 is located a distance  $a$  from the transition 13 between the shank and the inclined end portion. The hole in the inclined end portion 4' provided on the other shank 2' is located a distance  $b$  from the free end 14 of this portion, the distance  $a$  being equal to or insignificantly greater than the distance  $b$ . The distance  $c$  between the hole 5' and a slightly bevelled corner 15 of the portion 4' is, however,

greater than the distance  $a$ . As long as the portion 4' is kept in face-to-face contact with the portion 4, the shanks 2 and 2' cannot be turned relatively to one another about the axis of the eye bolt 6 because of the position of the corners 15 and 16 of the portion 4'. A resilient means in the form of a ring 18 of rubber or the like is mounted between the upper side of the inclined end portion 4 of the shank 2 and a washer 17 fixedly disposed on the bolt shaft adjacent the ring and serving as an abutment. The end of the bolt shaft projecting downwardly through the holes 5 and 5' is provided with an abutment in the form of a stop ring 19 and the fit between the bolt shaft and at least one of the holes (preferably the hole 5' of the portion 4') is such that a certain freedom of movement is allowed for. This freedom of movement is achieved if the hole is made conical or possibly biconical.

The biasing action of the resilient ring 18 ensures a determined abutment pressure between the inclined portions 4 and 4' of the shanks 2 and 2', and thereby locking of the shanks in the operative position.

When the anchor is to be collapsed, the flukes are pulled apart from each other, and it is then possible to cause the corner 15 of the portion 4' to slide past the inner side 20 of the shank 2 which slopes outwardly away from the hole. When the flukes are pulled apart from each other, the resilient means will, as is apparent from Figures 7 and 8, be compressed. The bolt will thereby be shifted slightly in the axial direction and also incline somewhat with respect to the hole 5'. When the projecting corner portion 15 has slid a distance along the shank surface 20 such that the centre point of the surface has been passed, the resilient means will assist in the continued movement in the collapsing direction. In the event of movement in the opposite direction, a similar compression of the resilient means must take place before the shanks reach their correct operative position and, also in this case, the means 18 assists in the movement towards the end position once the corner 15 has passed the centre point of the shank surface 20.

The idea with the locking of the anchor in the operative position is essentially such that turning of the shanks in relation to each other cannot take place without manual movement of the flukes apart from each other. Other forces which may act upon the anchor during the anchoring operation will be in the opposite direction, so that the anchor will thereby be locked even harder.

Adaptation of the position of the hole 5' in relation to the region 21 at the transition between the shank 2' and the portion 4' can realize a similar locking function when the shanks 2 and 2' reach their collapsed position shown in Figure 4. Thus, the distance  $b'$  and

$c'$  in Figure 7 should correspond substantially to the distances  $b$  and  $c$ .

- The device described provides realizes a simple, rapid and effective locking mechanism which, moreover, totally lacks movable parts with a tendency to corrode.

#### WHAT WE CLAIM IS:—

1. A collapsible anchor comprising two shanks, each provided with a fluke extending laterally of the shank, the shanks being pivotably interconnected by a bolt which passes through holes in end portions of the shanks, one of the end portions engaging an abutment on the bolt and the other end portion being engaged by a compressed resilient element disposed between that other end portion and a further abutment on the bolt, each end portion being inclined to the main portion of the respective shank, and the end portion of one of the shanks engaging the other shank in such a way as to prevent relative pivotal movement of the shanks out of an operative position in which the shanks are inclined to one another, the end portions being tiltable away from each other by compressing the resilient element to move the end portion of the said one of the shanks out of engagement with the said other shank to allow the shanks to be folded together into an inoperative position.

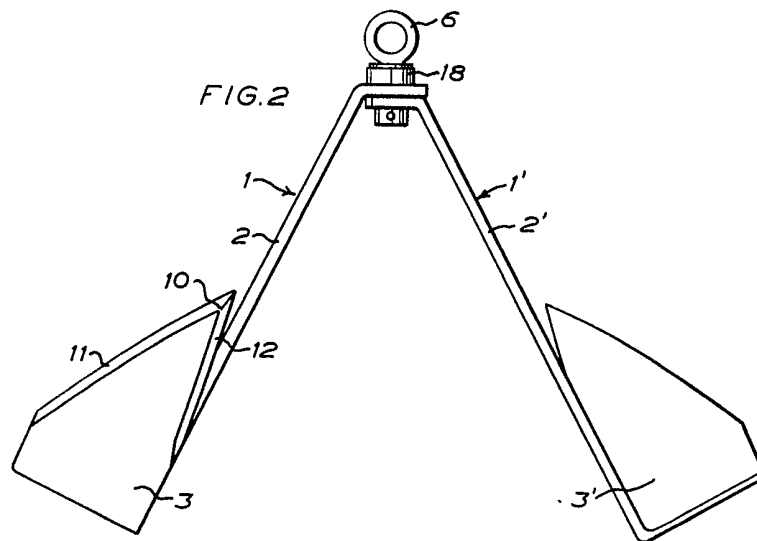
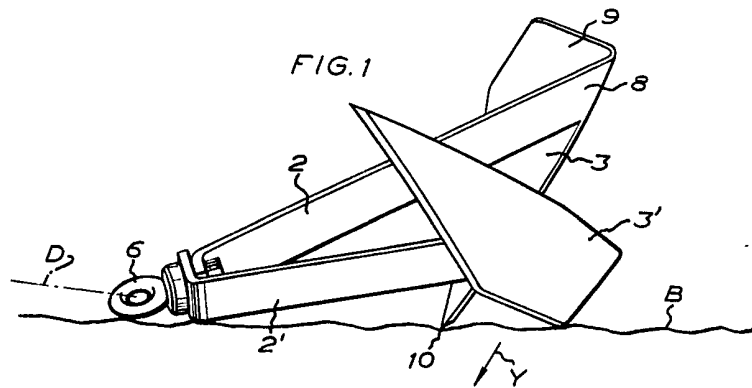
2. A collapsible anchor as claimed in claim 1, in which the resilient element is a rubber ring.

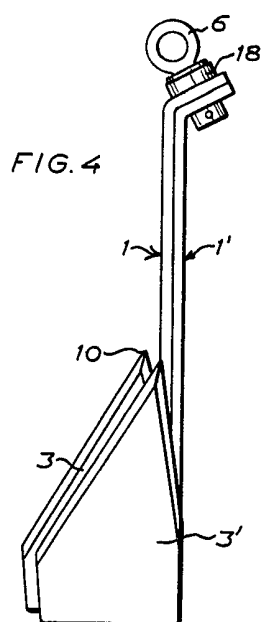
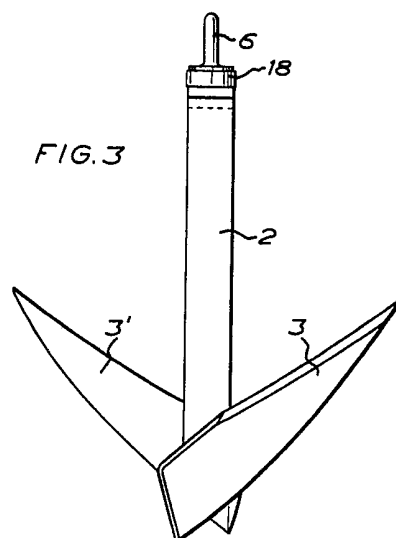
3. A collapsible anchor as claimed in claim 1 or 2, in which the end portion of the said one of the shanks has a bevelled edge which engages the surface of the said other shank adjacent the transition between the main portion and the end portion of that other shank.

4. A collapsible anchor as claimed in any one of claims 1 to 3, in which the bolt is a clearance fit in the hole in the end portion of the said one shank.

5. A collapsible anchor substantially as described herein with reference to the accompanying drawings.

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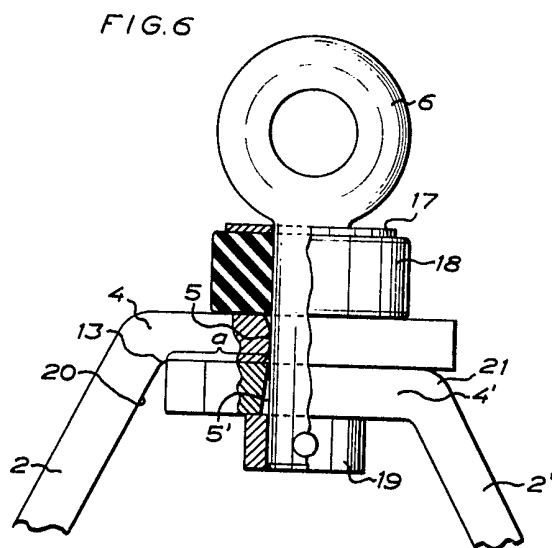
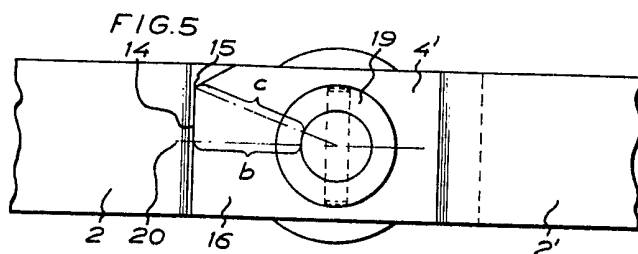


FIG. 7

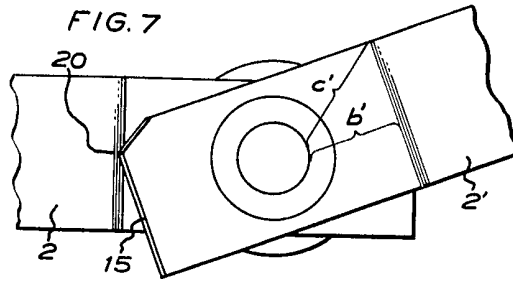


FIG. 8

