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C. A. D. BAYLEY
SUBAQUEOUS STRUCTURES FOR SUPPORTING A WORKING
PLATFORM ABOVE WATER

2,862,738

Filed Oct. 27, 1954

3 Sheets-Sheet 1

Fig. 1.

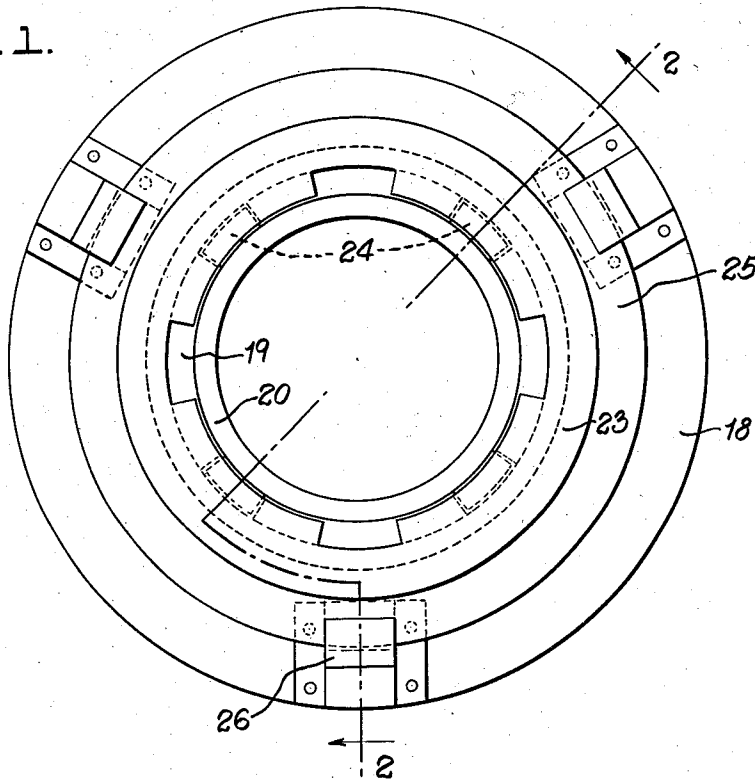
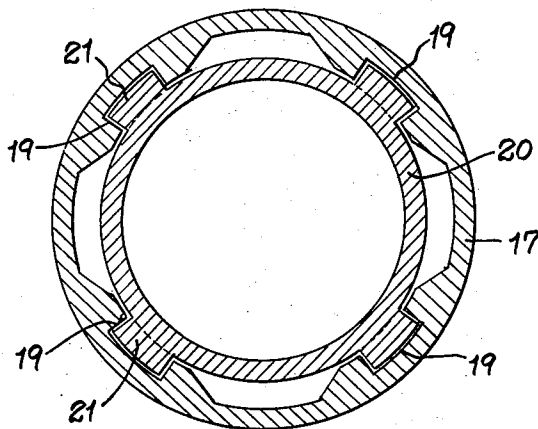


Fig. 3.



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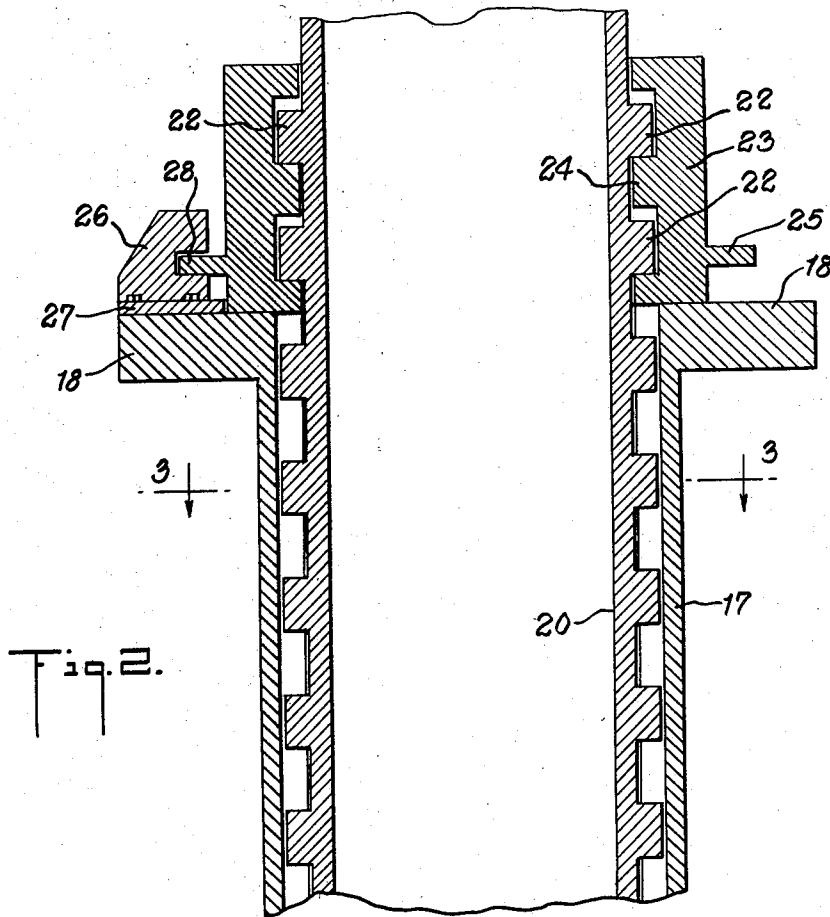
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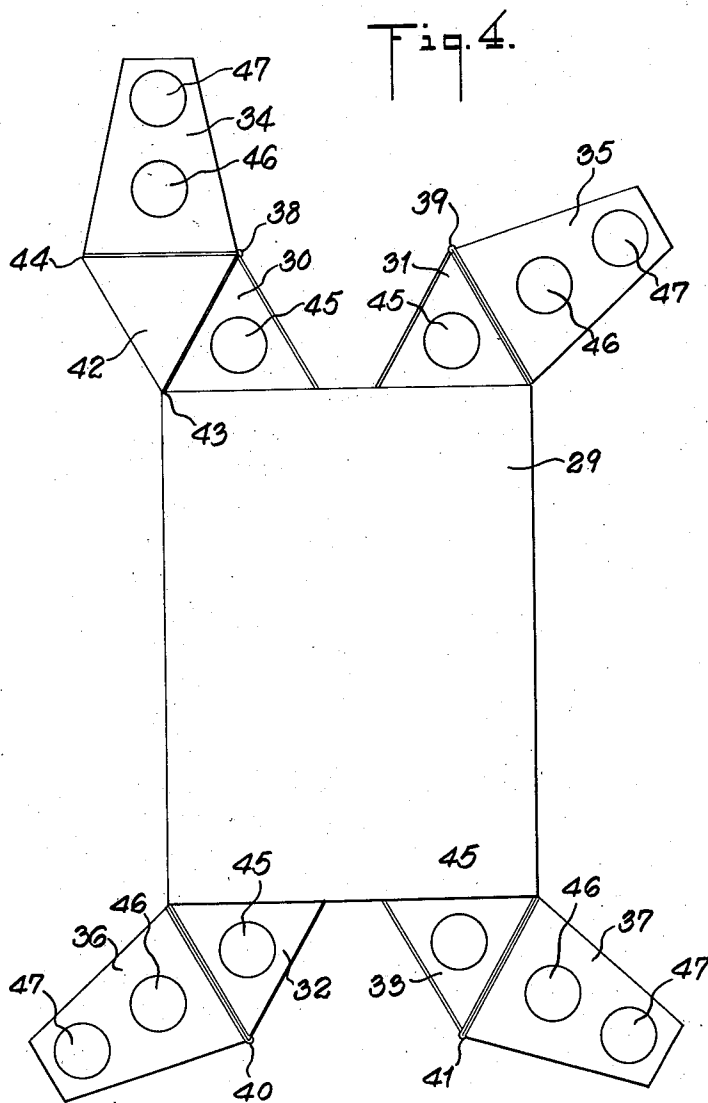
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SUBAQUEOUS STRUCTURES FOR SUPPORTING A WORKING PLATFORM ABOVE WATER

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Application October 27, 1954, Serial No. 465,022

4 Claims. (Cl. 287—58)

My invention relates to improvements in a subaqueous structure for supporting a working platform such as is shown and described in my Patent No. 2,667,038.

As described in said patent the subaqueous supporting structure comprises a caisson which may be submerged to rest on or in the bed of a body of water to support a well drilling platform for offshore drilling of oil wells.

The caisson, which may be built of a hollow structure of steel or concrete, such as horizontal hollow cylindrical structures joined integrally by cross beams, may be floated to a position and then sunk by withdrawing air from the hollow interior of the caisson.

The caisson has at transversely and crosswise spaced intervals boxes open at their upper ends in which are supported the lower ends of supporting columns which extend upwardly above the surface of the water to support the working platform. The columns are made of telescoping hollow cylinders. The outer of these cylinders is supported in the boxes of the caisson, and the inner cylinders which have closed ends may be supported in the outer cylinders by filling the outer cylinders to the required depth with sand or gravel. The inner cylinders are thus supported against downward movement but not against upward movement and on certain occasions in handling the cylinders may float upwardly.

An improvement of my present invention is to provide a column in which the inner cylinder may be locked in a selected vertical position against either upward or downward displacement or movement.

When the caisson is located on the bed of a body of water in location for drilling it may rest on the surface of the bed or may be partly sunk into the bed. To keep it from shifting under the action of waves or storms, piles are driven into the bed beyond the outer periphery of the caisson and the caisson anchored to these piles by extensions thereof. These serve to anchor the caisson in position but require additional structure for sinking the piles and anchoring them to the caisson and must be removed when the drilling has been completed and the platform is to be removed.

An improvement of my present invention is to provide a caisson having extensions beyond the normal periphery thereof having openings through which columns or piles may be sunk into the bed of the body of water and then locked in position on the extensions thus securing the caisson in position and also strengthening it against horizontal or sidewise stresses.

Extending elements of these extensions may be hinged in such a manner that when the caisson is being towed from its place of construction to its first location of use they may be swung inwardly to pass through narrow passages. After this the extensions remain in the positions of use. The extensions also serve to give the caisson greater stability against tilting both when it is located in place and when being towed from one location to another.

The various features of my invention are illustrated,

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by way of example, in the accompanying drawings in which—

Fig. 1 is a plan view of a column embodying a preferred form of my invention;

Fig. 2 is a vertical section of a part of the column taken on line 2—2 of Fig. 1 and showing the manner of locking an inner and outer column of the cylindrical element;

Fig. 3 is a section of a column taken on the line 3—3 of Fig. 2;

Fig. 4 is a plan view of a caisson and the extensions embodying my invention.

In the embodiment of the invention shown in Figs. 1, 2 and 3, the upper end of an outer cylindrical element 17 (corresponding to the element 17 of my Patent 2,667,038) and having an outward flange 18 at its upper end, is provided in the inner surface with a number of vertical guides 19, suitable to concrete, structural steel or other material used, four being shown by way of example. Within the vertical outer cylinder 17 is an inner cylinder 20 (corresponding to the cylinder 20 of my Patent 2,667,038). Projecting outwardly from the cylinder 20 are four interrupted splines or ribs 21 spaced to fit into the vertical guides so that the cylinder 20 may rise vertically relative to the cylinder 17 but is held from rotation relative thereto. The interrupted spline 21 is formed of a number of equally spaced projections 22.

Rotatably mounted on the upper supporting flange 18 of the outer cylinder 17 is a ring 23 coaxial with the cylinder 17 and having inwardly extending projections 24, the vertical dimensions of these projections being less than the vertical dimension of the spaces between the projections 22 and spaced to permit them to pass readily between the projections 22. Accordingly the ring 23 may be rotated to one position in which the projections 24 will be between the vertical series of projections 22 that make up the interrupted spline of the inner cylinder and thus permit the inner cylinder to be lifted relative to the outer cylinder.

The ring 23 may be rotated or shifted in position in which the projections 22 and 24 interlock thus preventing any relative vertical movement between the ring 23 and the inner cylinder 20.

The ring 23 resting on the upper end and flange 18 of the cylinder 17 thus supports the inner cylinder 20 upon the outer cylinder 17. To prevent upward movement of the inner cylinder and ring when thus locked in position the ring is provided with a horizontal outer flange 25 which is rotatably secured in clips 26 having horizontal flanges 27 which are bolted or otherwise secured on the flange 18, and is also provided with a slot or notch 28 to receive the flange 25. As shown in Fig. 1 there may be three or more such clips uniformly or symmetrically distributed on the flange 18.

It will thus be apparent that by rotating the ring 23 in one position the inner cylinder 20 may be lifted vertically to any selected height and then upon rotation of the ring locked in this position.

It will be understood that the lower end of the cylinder 20 may be closed and that this cylinder may be filled with air when desired to give it sufficient buoyancy so that it may be readily raised or lowered.

In Fig. 4 there is shown diagrammatically, by way of example only, a caisson 29 of substantially rectangular horizontal section. This caisson may be constructed of hollow closed tubular elements (such as those shown in my Patent 2,667,038) united by cross beams and having open boxes or recesses at spaced intervals to receive and support the upwardly extending supporting columns. Only the outline of the caisson is shown in Fig. 4. The

present invention is not limited to any particular details of construction.

In the caisson shown in Fig. 4, there are four extensions 30, 31, 32 and 33, at the corners thereof. Where the caisson 29 is not square but elongated, these extensions are preferably from the shorter sides and extending in the direction of the longer axis of the rectangle. The extensions 30—33 preferably form an integral part of the caisson 29. Four movable extensions 34, 35, 36 and 37 are attached at any convenient time to the respective extensions 30—33. They may be attached by hinges 38, 39, 40 and 41 at the outer apices of the extensions 30—33 so that each extension may be swung either to the position of extensions 35—37 and locked securely to its respective corner of the main body 29 of the caisson. The extensions are in these positions when the caisson is in position on the bed of the body of water to support the working platform. Additional similar extensions may be used and attached elsewhere when designs so require.

When the caisson is floated and being towed, the extensions give stability against rocking or tilting of the caisson and any structure on it. When the entire structure is afloat, auxiliary buoyancy will be required and applied to the superstructure of the caisson, as determined by studies in each design.

If and when the caisson is to be towed through a narrow passage to its first location preparatory to adding the superstructure in which the position of the extensions as shown at 35—37 would obstruct the passage, the extensions may be swung on respective hinges at 38—41 to the position 34 in Fig. 4 and held in this position by a strut 42 extending from a corner 43 of the rectangular part of the caisson 29 to a corner 44 of the respective extension 34.

Each of the extending parts 30—33 may for certain conditions be provided with a vertical hole 45, and each of the extensions 34—37 with one or more openings 46, 47, etc. (two being shown by way of example). Each hole may have circumferentially spaced guides similar to guides 19 through which may extend a cylinder, not shown, open at its lower end and closed at its upper end and interrupted spline and guide elements similar to 22 to permit the cylinders to be moved vertically and to be locked in position by a ring such as the ring 23, or equivalent means. Compressed air connections to these cylinders may be provided to give them buoyancy. They may be provided with means for upward extensions if circumstances make that desirable. Thus, for example, the cylinders in the various openings 45—47 may be placed in position and, if conditions require, permitted to sink into the bed of the body of water under their own weight, then they may be locked to their respective parts of the caisson and the caisson submerged, carrying

the cylinders further into the bed under the additional weight of the caisson itself. In this way a very firm anchorage may be obtained quickly and easily.

If it is desired at any time to give the cylinders thus inserted in the openings 45—47 any buoyancy this may be done by supplying compressed air to the cylinders, displacing water to any depth therein down to the lower open end of the respective cylinders. By the use of compressed air the release of these cylinders from the bed of the body of water may be expedited, the compressed air acting as a buoyant agent and for jetting assistance. It will be understood that additional extensions may be attached for stability or buoyancy. These extensions may thus be added beyond the area of the superstructure to any desired extent.

Having described my invention, what I claim is:

1. A column for supporting a working platform above a submerged base structure which comprises a hollow vertical outer cylinder having vertical grooves spaced circumferentially about its inner periphery, a hollow inner cylinder within said outer cylinder having circumferentially spaced vertical series of spaced projections extending into said grooves to permit said inner cylinder to move vertically relative to said outer cylinder and to prevent rotation on its vertical axis relative thereto, and a ring mounted in fixed vertical position on said outer cylinder to rotate on the vertical axis thereof and having inwardly extending lugs spaced circumferentially to engage between the spaced projections of said inner cylinder in one position of said ring and movable on rotation of said ring to clear said projections and permit said inner cylinder to move vertically relative to said outer ring.

2. The column of claim 1 having clips secured on said outer cylinder and slidably engaging said ring to permit rotation thereof.

3. The column of claim 1 in which said ring has an outwardly projecting circular flange and in which clips are mounted in fixed position on said outer cylinder and have grooves slidably engaging said flange.

4. The column of claim 1 in which said inner cylinder is closed at its lower end.

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