

Feb. 25, 1969

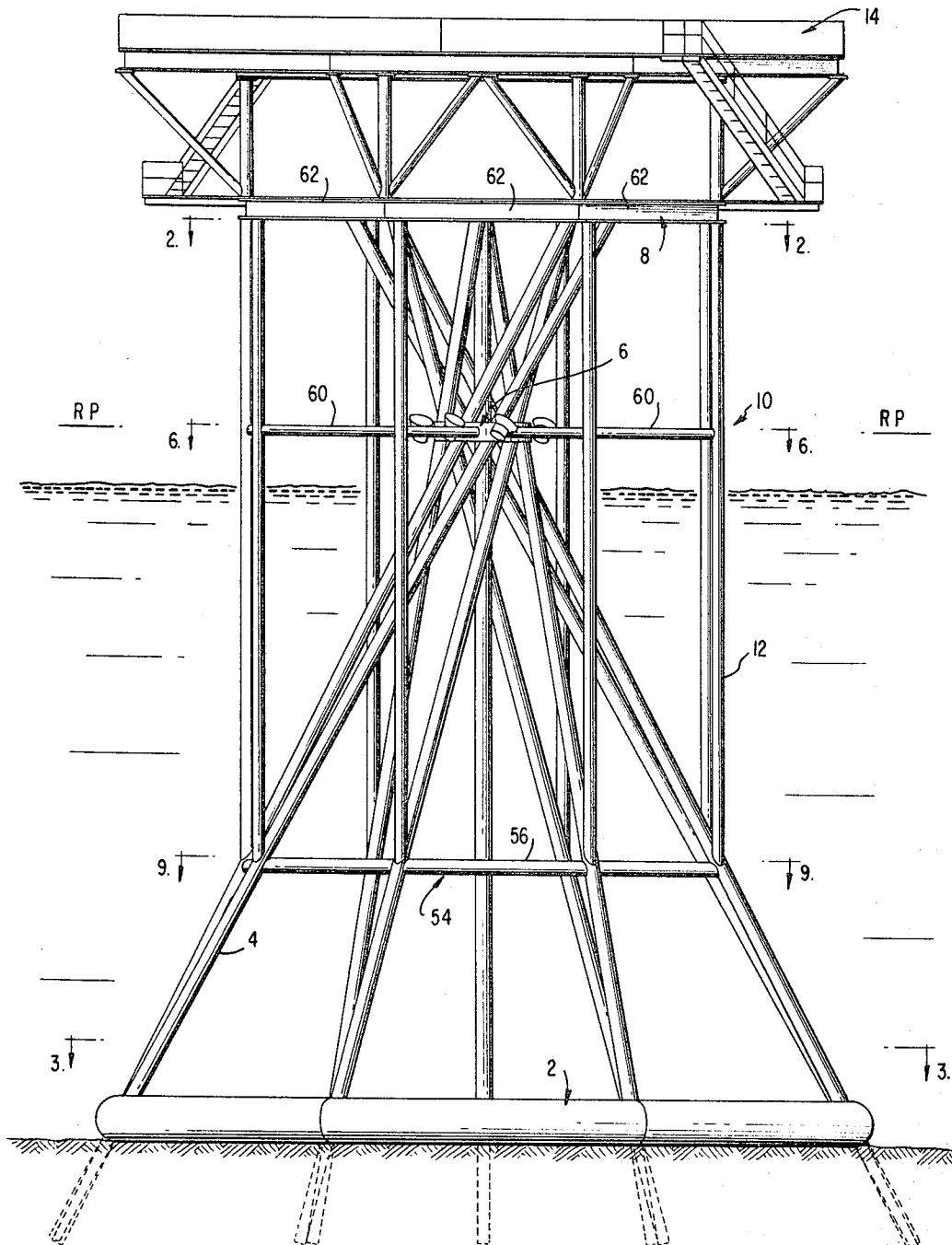
F. R. HAUBER

3,429,133

OFFSHORE TOWER

Filed April 19, 1967

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FIG. 1

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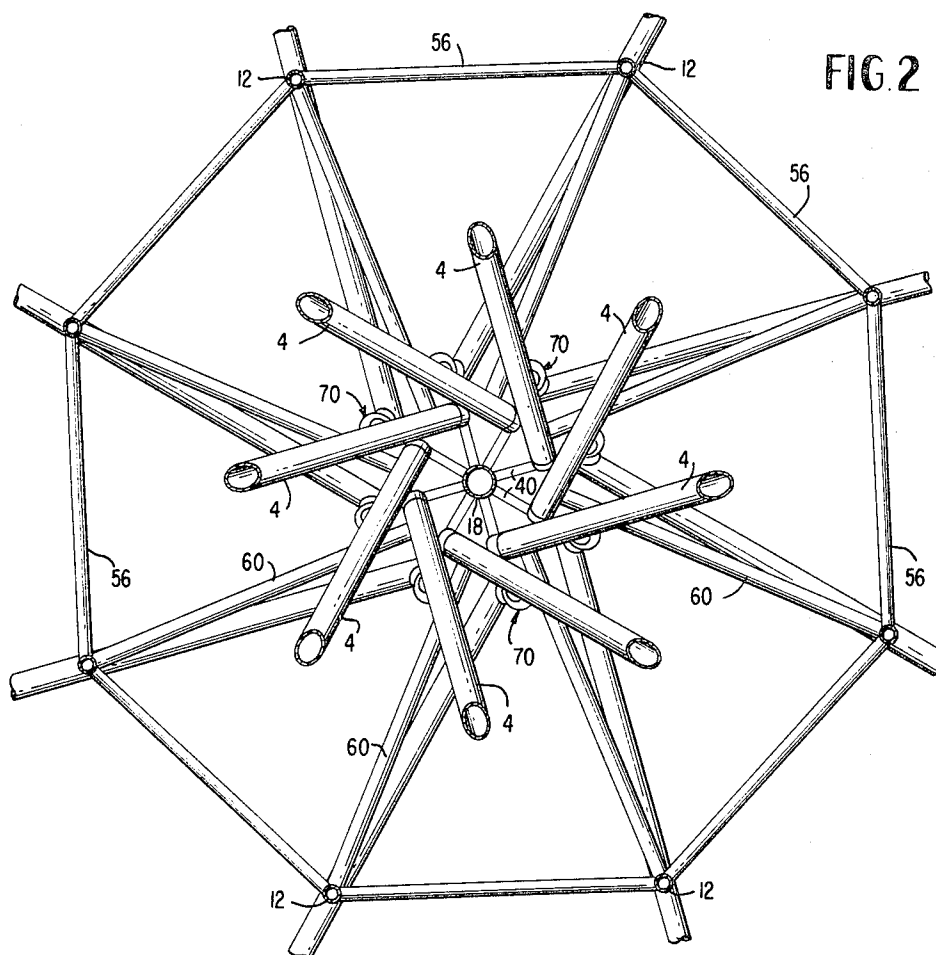


FIG. 2

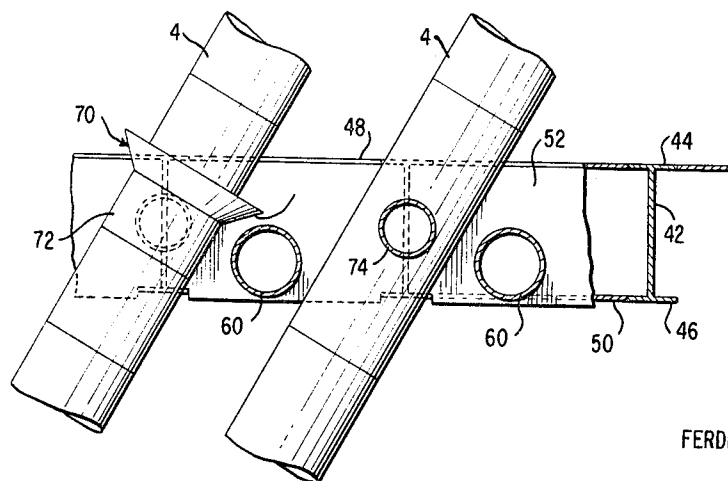


FIG. 8

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FIG. 9

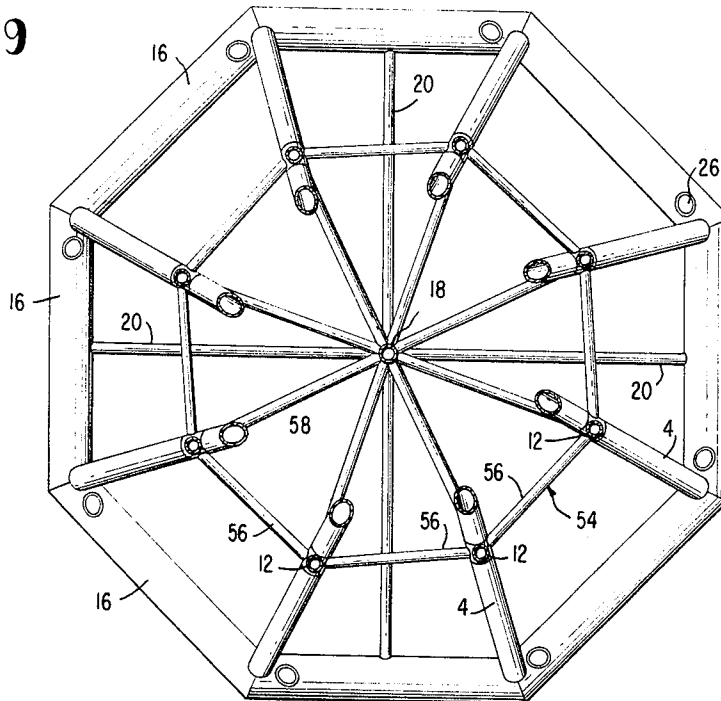
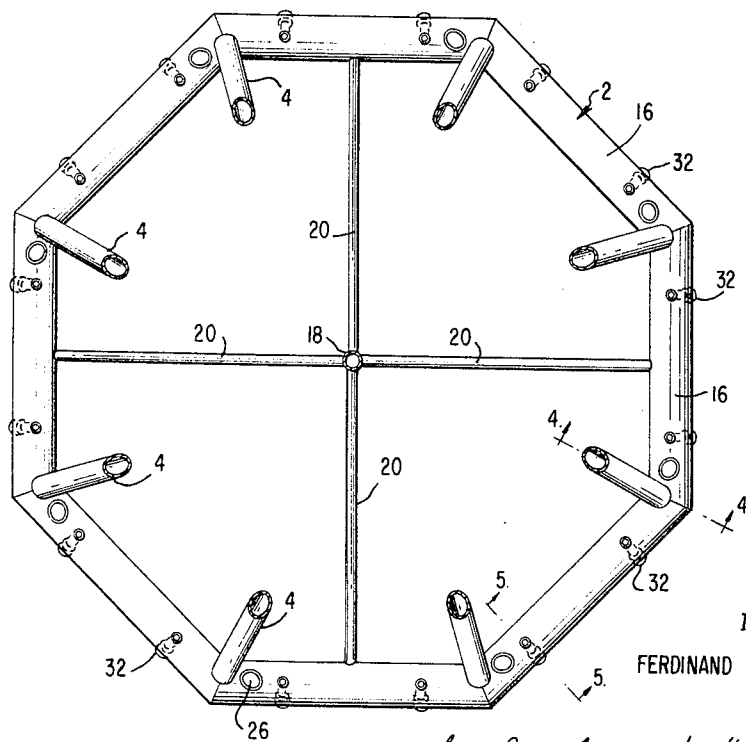


FIG. 3



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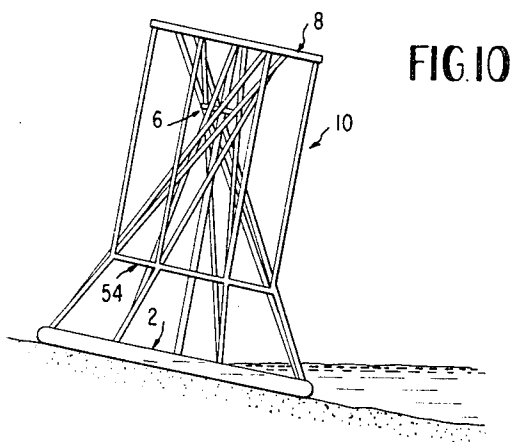


FIG. 10

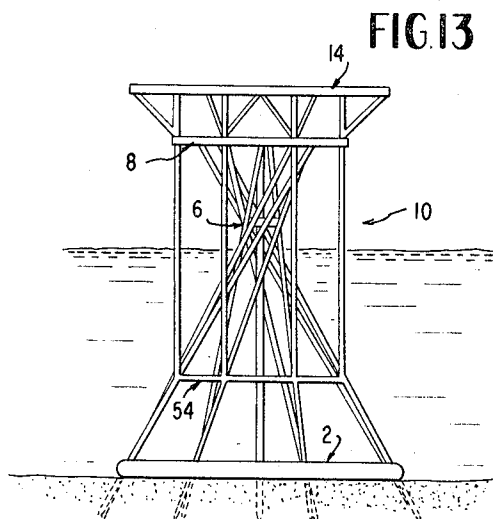


FIG. 13

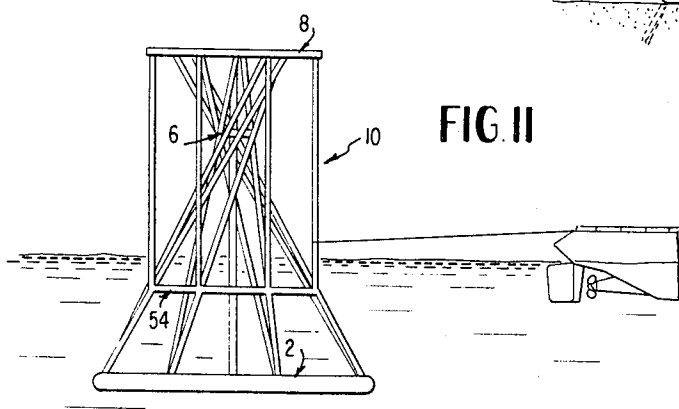


FIG. 11

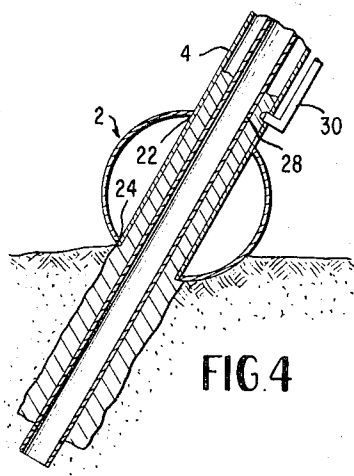


FIG. 4

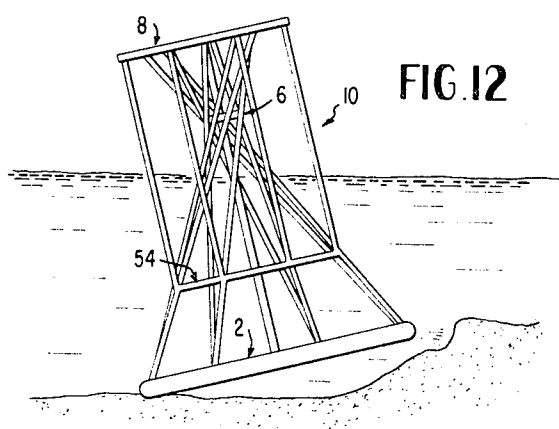


FIG. 12

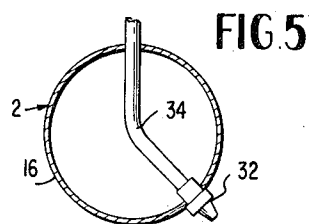


FIG. 5

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FIG. 7

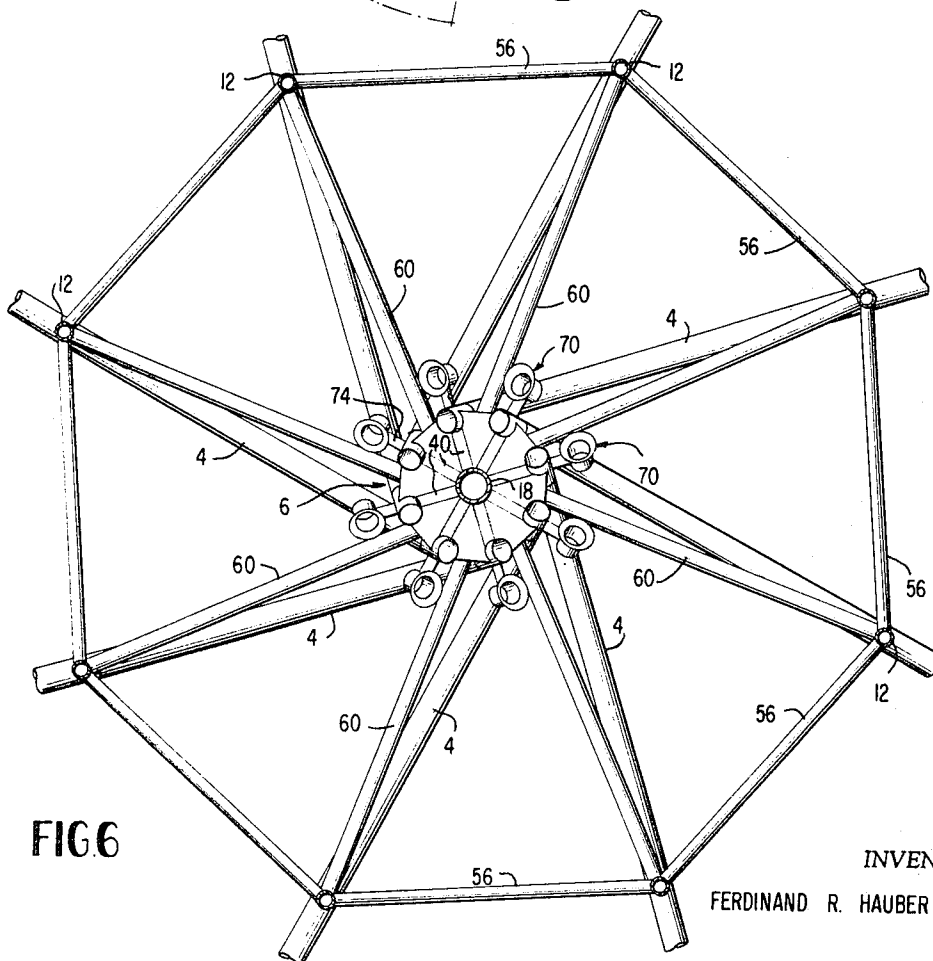
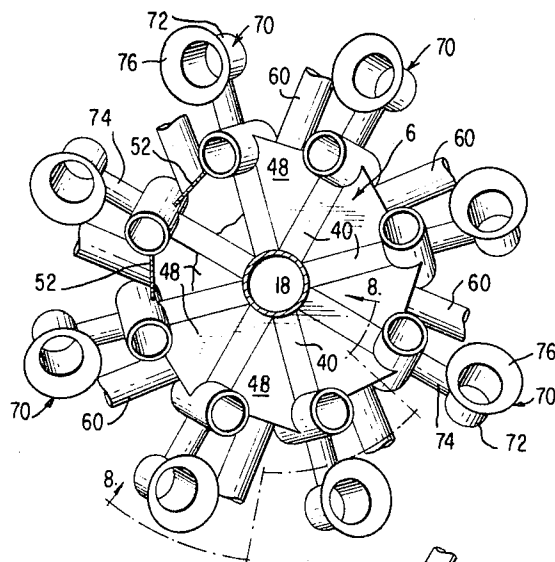


FIG. 6

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OFFSHORE TOWER

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Filed Apr. 19, 1967, Ser. No. 631,966

U.S. Cl. 61-46.5

8 Claims

Int. Cl. E02b 17/02

ABSTRACT OF THE DISCLOSURE

A tower suitable for use in offshore well operations and the like including a plurality of upwardly extending, generally straight legs spaced about and disposed in a swirling pattern generally along the exterior surfaces of two mutually intersecting, oppositely directed, upper and lower conoidal surfaces of revolution developed concentrically about a single vertical axis. Connecting means rigidly support the legs in spaced relation. A hollow toroidal base secured to the lower ends of the legs provides sufficient buoyancy to float the tower in the water and may be selectively flooded to cause the tower to rest on the seabed.

Background of the invention

This invention relates to an offshore tower of the type adapted to be positioned on the bed of a body of water with portions of the tower extending upwardly above the surface of the water, such as for example an offshore drilling platform, radar tower or the like.

Drilling for oil in oil or gas fields situated beneath the surface of a body of water such as the sea or a lake is frequently performed utilizing a drilling tower supported upon the seabed and extending above the surface of the water. Some forms of drilling tower include piling driven deep into the seabed while by contrast certain other types of drilling tower are relatively more movable, being provided with a base adapted to rest on the seabed.

One example of a drilling platform of the latter type includes two opposed parallel buoyant skids, each of which supports an upwardly extending, converging, generally triangular side frame. The side frames are stiffened with interior cross bracing and connected together by transverse bracing intermediate the frames. Such a platform may, however, sometimes prove unsatisfactory for a number of reasons.

For example, in violent sea conditions such structure may sometimes prove insufficiently rigid to withstand the various hydrodynamic loads imposed upon the structure, with consequent possible hazards to personnel and drilling apparatus on the tower.

Additionally, a skid structure of the type described, including two linearly extending buoyant chambers, frequently has a preferred direction of motion both when the platform is being skidded along ground surfaces and also when the platform is being towed through the water in a floated condition. Preferred directional orientation of this type may pose serious difficulties if it is required to move the tower in a direction other than the preferred direction of motion.

A further problem may arise if, as is common, the seabed is uneven in the location desired to be drilled. In this event, during placement of the tower at the desired location, portions of the skids may settle onto vertically projecting discontinuities in the seabed, thus causing the tower to come to rest at a substantial and undesirable inclination to the vertical.

One particular situation in which conventional platforms of the type described may additionally prove in-

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adequate arises in drilling a so-called "shallow" field where productive oil and gas sands lie close to the seabed. In order to provide the most effective drilling coverage for such a field it is usually necessary to drill a plurality of shafts inclined to the vertical, a task which may not easily be performed with present conventional platforms which are usually adapted to support drilling apparatus for operation about a single vertical axis only.

Summary of invention

It is therefore a general object of the invention to provide an offshore tower designed to obviate problems of the type described above.

It is another object of the invention to provide an offshore tower of the type adapted to rest on the seabed, having a particularly rigid and rugged construction to withstand excessive environmental hydrodynamic forces occasionally exerted on the water.

It is a further object of the invention to provide an offshore tower of the type described which may easily be settled onto the seabed in a vertical orientation despite the presence of vertically extending discontinuities in the seabed.

It is another object of the invention to provide an offshore tower which may be moved horizontally in any direction with equal facility both during skidding operations along the ground surfaces and during towing in a floating condition.

It is a yet another object of the invention to provide an offshore tower particularly suitable for applications involving the drilling of a number of adjacent bores at a substantial inclination to the vertical such as may be required for example in the development of shallow oil fields.

It is yet a further object of the invention to provide a particularly convenient method for positioning an offshore tower at a desired location.

One preferred embodiment of the invention intended to accomplish the foregoing objects comprises an offshore tower adapted to rest upon the bed of a body of water with portions of the tower extending above the surface of the water. The tower includes a plurality of upwardly extending, generally straight legs spaced about and disposed in a swirling pattern generally along the exterior surfaces of two mutually intersecting, oppositely directed upper and lower conoidal surfaces of revolution developed about a common vertical axis. The legs are rigidly connected together in spaced relation to provide a tower possessing the particular rigidity associated inherently with conoidal structures.

The tower may be floated or settled on the seabed by respectively emptying or filling with water, a hollow toroidal base joining the lower ends of the legs and adapted to rest on the seabed.

The tower may be moored to the seabed by riser tubes positioned concentrically within the legs and adapted to be driven partially outwardly thereof into the underlying seabed.

In an important aspect of the invention each riser tube is adapted to guide a drilling string extending downwardly through each leg out into the seabed at an inclination to the vertical. In this manner a number of inclined bores may be drilled at a single site.

The drawings

In accordance with these objects, an offshore tower forming one preferred embodiment of the present invention is illustrated in the accompanying drawings in which:

FIGURE 1 is a side view of the preferred embodiment

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of the offshore tower shown resting on the bed of a body of water at a desired offshore location;

FIGURE 2 is a cross-sectional top view of a portion of the drilling platform shown in FIGURE 1 taken along the lines 2—2 therein;

FIGURE 3 is a cross-sectional top view of a portion of the offshore tower shown in FIGURE 1, taken along the lines 3—3 therein, showing the base;

FIGURE 4 is a cross-sectional side view of a portion of the offshore tower shown in FIGURE 3, taken along the lines 4—4 therein, showing a riser tube projecting into the seabed;

FIGURE 5 is a cross-sectional side view of a portion of the drilling platform shown in FIGURE 3, taken along the lines 5—5 therein, showing a fluid-directing nozzle forming a part of the present invention;

FIGURE 6 is a cross-sectional top view of a portion of the drilling platform shown in FIGURE 1, taken along the lines 6—6 therein, showing the connecting frame;

FIGURE 7 is a top view on an enlarged scale of the central portion of the connecting frame shown in FIGURE 6;

FIGURE 8 is a developed, partially sectional side view of a portion of the connecting frame shown in FIGURE 7 taken along the lines 8—8 therein;

FIGURE 9 is a cross-sectional view of a portion of the drilling platform shown in FIGURE 1, taken along the lines 9—9 therein, showing the lower frame of the jacket;

FIGURE 10 is a side view of the offshore tower forming the preferred embodiment of the invention, shown positioned on a shore prior to floatation in an adjacent body of water;

FIGURE 11 is a side view of the offshore tower shown in FIGURE 10 during towing of the tower in floating condition to a desired location;

FIGURE 12 is a side view of the offshore tower shown in FIGURE 10 being settled onto the bed of the body of water during flushing away of an upstanding projection on the bed; and

FIGURE 13 is a side view of the drilling platform shown in FIGURE 10 secured to the bed of the body of water by risers and with the superstructure affixed to the drilling platform.

Detailed description

Referring to FIGURE 1 of the drawings, the preferred embodiment there shown includes a plurality of spaced straight tubular legs 4 disposed in a swirling pattern about single central vertical axis. The pattern may best be envisaged by imagining the legs to be initially disposed in upright slightly convergent relation with the legs equally spaced about the peripheries of two vertically spaced upper and lower, circular frames, to define a structure resembling an upended squirrel cage. If the upper frame is imagined to be subsequently rotated through an arc relative to the lower frame, the legs would be moved into a swirled pattern in which the legs converge from their upper and lower ends towards a central zone of constriction spaced a short distance above the midpoints of the legs. In this swirled pattern the legs may be considered to be disposed generally about and to closely approach the exterior surfaces of two hypothetical, mutually intersecting, upper and lower cone-like surfaces of revolution (hereinafter referred to as the conoidal surfaces), developed concentrically about the single, central vertical axis.

Referring in more detail to FIGURE 1, the lower ends of the legs 4 are rigidly connected by a lower frame comprising a generally toroidal, compartmented, base 2 adapted to rest on the seabed. The compartmented base 2 possesses sufficient buoyancy to cause the tower to float but may be selectively flooded to settle the tower onto the seabed. The legs 4, fixedly secured to and equally spaced about the compartmented base 2, extend upwardly therefrom. The lower portions of the legs 4 are disposed generally along and spaced equally about the exterior sur-

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face of an upwardly converging lower conoidal surface of revolution concentric with the vertical axis in the manner previously described. Similarly the upper portions of the legs 4 are disposed generally along and spaced equally about the exterior surfaces of a downwardly converging, upper conoidal surface of revolution concentric with the vertical axis and intersecting the lower conoidal surface of revolution. The legs 4 are also rigidly connected in spaced relation adjacent their zone of closest convergence by a connecting frame 6 and by an upper frame 8 secured to the upper extremities of the legs 4.

Additional bracing for the upper frame 8 is provided by a jacket, generally designated 10, which includes vertical spars 12 spaced radially from and parallel to the central axis and extending upwardly from each leg to an adjacent portion of the upper frame 8. A superstructure 14 for supporting drilling apparatus and personnel is releasably secured to the upper frame 8.

Referring in more detail to FIGURES 1 and 2, the legs 4 are spaced equally about the periphery of the toroidal base 2 and extend upwardly and inwardly therefrom. The legs 4 mutually converge until they intersect a horizontal plane, defined as a reference plane, designated RP in FIGURE 1, spaced above the lower extremities of the legs and below the upper extremities thereof. Above the reference plane the legs 4 mutually diverge. The longitudinal axis of each leg intersects the reference plane at an intersection point radially offset from the point of intersection of the central axis with the reference plane. This arrangement requires that the legs 4 be inclined inwardly of the compartmented base 2 at their point of attachment thereto and also that the legs be skewed angularly to avoid intersecting the central axis. This provides a swirling pattern of the legs in which, as previously described, they may be considered to be disposed generally along the exterior surfaces of the two oppositely directed, conoidal surfaces of revolution.

The described swirling arrangement whereby each of the legs extending inwardly from the base is radially offset relative to the central axis ensures that the legs follow nonintersecting paths in their passage through the reference plane (in which the connecting frame 6 is vertically disposed) while at the same time permitting the legs to assume a generally conoidal configuration, thereby providing the tower with the substantial added rigidity inherently associated with conical structures.

The previously mentioned toroidal base 2 (FIGURE 3) comprises eight similar tubular members 16 joined end to end to form a sealed, hollow, watertight compartmented, octagonal chamber disposed symmetrically about a central vertical axis. It will be appreciated that the number of tubular members 16 may be varied to provide other poly-sided configurations of the base 2. A vertically extending, central tube 18, concentric with the vertical axis of the tower, has its lower extremity positioned centrally of the base 2 by four identical, horizontally disposed struts 20 secured to the exterior of the shaft 18 and spaced at ninety-degree intervals thereabout. The radially outward end of each strut 20 is secured at right angles to an adjacent portion of an adjacent one of the tubes 16.

In skidding the tower along the ground, as may be required in moving it along a shore to the waterline, the symmetrical configuration of the base enables the tower to be moved with relatively equal facility in any desired direction. Additionally, the symmetrical disposition of the legs of the tower about the vertical axis in conjunction with the symmetrical base advantageously ensures that the tower, while being towed through the water in floating condition, has substantially no preferred direction of motion nor any tendency to steer itself out of the line of towing.

Each of the previously mentioned legs 4 is connected to the base 2 at the intersection of a pair of the tubes 16. Referring to FIGURE 4, each leg 4 is tubular and extends diametrically through the base 2, passing through upper and lower apertures 22 and 24 provided in the base 2 to receive the leg 4. Each leg 4 at its lower extremity is

open and terminates flush with a lower surface portion of the base 2. The base 2 and each leg 4 are fixedly secured together in sealed relation about the apertures 22 and 24 to prevent the ingress of fluids into the interior of the base 2 from the outside or from within the legs 4.

It will be appreciated that the interior portions of the tubes 16 define a peripherally extending compartmented, fluid-tight, buoyancy chamber disposed symmetrically about the central vertical axis of the tower. The dimensions of the tubes 16 are such that when they are filled with air, they collectively provide sufficient buoyancy to cause the tower to float in an upright condition in the surrounding body of water.

Conventional liquid filling and emptying means (not shown) are connected with each compartmented portion of the base 2 so that the base may be selectively filled with air or flooded with water to respectively float the tower or settle it onto the underlying seabed. The independent compartmentation of the base, with each water-tight compartment equipped with its own flooding valves and air lines allows the tower to be ballasted and tilted in the buoyant condition as required.

Positioned adjacent and spaced from each of the legs 4 are a plurality of hollow, vertically extending sleeves 26 passing through an adjacent portion of each of the tubes 16 and sealed thereto top and bottom in a manner similar to that previously described for the legs 4. Each tube 26 is of sufficient diameter to slidably receive an auxiliary leg of the same diameter as one of the legs 4 for a purpose to be described hereinafter.

In order to enable the tower to be positively secured to the bed beneath the body of water, each of the legs 4 receives a generally coextensive, concentric riser tube 28 of a size somewhat smaller than the interior of the leg 4. Each riser tube 28 may be driven downwardly and partially outwardly of the leg 4 into the underlying seabed, following conventional pile driving techniques. Grout is then pumped downwardly into the annulus between the riser tube 28 and the leg 4 through a grouting pipe 30, to secure them together in fixed relation. Portions of the grout may additionally be forced under pressure into the underlying seabed. Details of one grouting system suitable for use in the preferred embodiment of the invention are provided in applicant's copending application Ser. No. 494,289, filed Aug. 27, 1965.

The operations of driving the risers outwardly from the legs and grouting are desirably performed using conventional equipment positioned on a barge floating adjacent the tower. However, in unsettled or rough sea conditions it may be necessary to perform the riser installation and grouting utilizing apparatus positioned on the tower itself.

In performing drilling operations, each of the riser tubes 28 is adapted to separately receive a conventional drilling string depending from drilling apparatus positioned on the superstructure 14. The riser tube 28 guides the drill string downwardly and outwardly of the riser tube into the underlying portions of the seabed to drill a bore therein at an inclination to the vertical. It will be appreciated that the leg and riser tube structure of the tower described, advantageously facilitates drilling of a plurality of inclined bores at a single site, as is desirable for the most effective development of "shallow" fields where the oil or gas lies relatively close to the surface.

In addition, drilling operations may also be performed utilizing the central tube 18 to guide the drilling string vertically downwardly into the underlying strata.

Also disposed symmetrically about the base 2 are a plurality of radially outwardly and downwardly directed nozzles 32 (FIGURES 3 and 5). Each nozzle 32 may selectively be supplied with fluid or a mixture of compressed air and other suitable fluid, under high pressure from a conventional source (not shown) through a pipe 34, and is adapted to direct the fluid downwardly and radially outwardly of the base 2 in the form of a high

pressure jet for purposes to be described. Although two jets mounted on each tube 16 are utilized in the preferred embodiment, it will be appreciated that any desired number or arrangement of jets 32 may be provided.

Referring to FIGURES 6 and 7, the previously mentioned connecting frame 6 includes a plurality of I-beams 40 fixedly secured at their radially inwardly extremities to the exterior of the central vertical tube 18 extending radially outwardly therefrom. Each I-beam 40 (FIGURE 8) includes a vertically disposed web 42 and upper and lower horizontal flanges 44 and 46 respectively.

Each I-beam 40 at its radially outward extremity is fixedly secured to the exterior of an adjacent one of the legs 4 with the horizontally disposed axis of symmetry of the I-beam in longitudinal alignment with a diameter of the leg 4. The upper and lower flanges 44 and 46 of each I-beam 40 are cut arcuately to partially embrace the curved exterior surface of the adjacent leg 4.

Positioned between adjacent pairs of upper flanges 44 and between adjacent pairs of lower flanges 46 of adjacent I-beams 40 and fixedly secured thereto, are upper and lower, horizontally disposed, radially outwardly extending, segmental decking portions 48 and 50 respectively. At their radially outer extremities, the decking portions are configured to embrace adjacent portions of the legs 4 and are secured thereto by welding or the like.

Extending upwardly between the radially outer peripheries of adjacent spaced decking portions 48 and 50 thereof, and extending peripherally between adjacent pairs of the I-beams 40, are vertically disposed, generally flat, plate members 52. Each plate member 52 at its peripheral extremities is configured to fit along adjacent portions of the adjacent legs 4 and is fixedly secured thereto.

The tower also includes the previously mentioned jacket 10 to support the upper frame 8 on which the superstructure 14 rests. The jacket 10 (FIGURES 1 and 9) includes a horizontally disposed jacket base frame 54 positioned vertically intermediate the base 2 and the connecting frame 6. The jacket base frame 54 includes a plurality of horizontally disposed, tubular struts 56 fixedly secured to and extending between adjacent legs 4. Each of the previously mentioned vertical struts 12 is fixedly secured to and extends vertically upwardly from one of the legs 4 adjacent the intersection thereof with the struts 56.

The jacket base frame 54 also includes a plurality of horizontally disposed, tubular, radial struts 58 fixedly secured to the exterior of the central vertical shaft 18 and extending radially outwardly therefrom. Each radial strut 58 is fixedly secured at its radially outward extremity to one of the legs 4 adjacent the point of connection thereof with the struts 56.

Additional bracing for the jacket vertical struts 12 is provided by a plurality of tubular, intermediate struts 60 (FIGURES 6 and 7) disposed generally in the reference plane. Each of the intermediate struts 60 is fixedly secured at its radially inward end to one of the previously mentioned vertical plates 52 of the connecting frame 6 (FIGURE 8) and is fixedly secured at its radially outward end to an adjacent one of the jacket vertical struts 12.

The previously mentioned upper frame 8 is secured to the upper extremities of the jacket vertical struts 12. Conventional decking is provided within the interior of the frame 8 and is suitably configured to receive the open upper ends of the legs 4 which extend through the decking to a position generally flush with an upper surface thereof.

The previously mentioned superstructure 14 which is adapted for the support of personnel, drilling apparatus, and miscellaneous equipment is releasably secured to the upper frame 8. Details of the conventional superstructure 14 and of the conventional means used to secure it to the upper frame 8 do not form a part of the present invention.

Also secured to the legs 4 are a plurality of upper guide sleeves 70 (FIGURES 7 and 8). Each upper guide sleeve 70 includes a cylindrical tube 72 spaced radially outwardly of an adjacent one of the legs 4 and fixedly secured thereto by a horizontally disposed cross tube 74 having its axis aligned with the axis of symmetry of the adjacent one of the previously mentioned I-beams 40. The lower sleeve 72 is of sufficient diameter to slidably receive an auxiliary leg equal in diameter to one of the legs 4 for a purpose to be described. Each sleeve 70 is additionally provided with an upwardly directed, outwardly flared, bell portion 76 to guide the auxiliary leg into the tube 72.

Each of the guide sleeves 70 is axially aligned with one of the previously mentioned sleeves 26 extending through the base member 2. The axes of each guide sleeve 70 and of its respectively aligned sleeve 26 are parallel to that of the adjacent leg 4.

In drilling particularly prolific oil or gas fields it is often advantageous to increase the number of bores drilled at one particular site. For this purpose, the guide sleeves 72 and the lower sleeves 26 are provided as they permit an auxiliary set of legs 4 to be installed about the tower, by sliding each of the auxiliary legs 4 through one of the various aligned pairs of guide sleeves 72 and lower sleeves 26, and subsequently fixedly securing the auxiliary legs thereto. A second set of bores may be then drilled through the auxiliary legs in a manner similar to that previously described. In this manner, drilling coverage provided at one location of the tower may be easily doubled.

In installing the tower, various prefabricated elements of the tower are assembled on a shore adjacent the body of water. After the tower has been assembled, it is skidded toward the water. The generally toroidal configuration of the base 2 permits the device to be skidded with relatively equal facility in any desired direction. Once the tower has been positioned adjacent the edge of the water (FIGURE 10) with the base in an air-filled condition, the tower is floated into the water using known techniques. The tower is then towed (FIGURE 11) to the desired location. The base may then be partially flooded to cause the tower to settle towards the sea. If, as shown in FIGURE 12, one portion of the base encounters a portion of the seabed projecting above the general horizontal level of the remainder of the bed, the tower will settle in an inclined position. At this time, with the tower still in a semibuoyant condition, pressure fluid is selectively directed through the jets 32 disposed adjacent the underlying projecting portions of the seabed to flush them away. As the tower attains a level position, pressure fluid to the selected jets is cut off and the base 2 fully flooded to settle the tower on the seabed with the upper portions of the tower projecting above the water level. In a final operation (FIGURE 13) the riser tubes 28 are driven into the seabed as previously described, to secure the tower firmly to the seabed.

It will be seen that in constructing an offshore tower according to the present invention, a tower uniquely suitable for use in offshore drilling and other like operations is provided.

In particular, the disposition of the legs about the surfaces of two oppositely directed intersecting conoidal surfaces provides the tower with the considerable added rigidity known to be characteristic of conical structures.

In addition, the symmetrical configuration of the base and the symmetrical disposition of the legs about the vertical axis ensures that the tower has no preferred direction of motion either during skidding along the ground or during towing through the water, with the desirable result that the tower may be moved with substantially equal facility in any desired direction.

Another important advantage is afforded by the jets disposed about the base, which enable projecting portions of the seabed to be flushed away by the application thereto of high pressure fluid so that the tower may be enabled to

settle on the seabed in a desired, vertically upright position.

A further advantage arises from the provision of a plurality of adjacent legs each of which may be used to guide drilling apparatus at an inclined angle, thus permitting a number of inclined bores to be drilled on one site, as is particularly desirable in drilling shallow fields where the oil or gas lies relatively close to the surface.

Although the invention is described with reference to one preferred embodiment, it will be apparent to those skilled in the art that additions, deletions and modifications, substitutions and other changes not specifically described and illustrated in this embodiment, may be made which will fall within the purview of the appended claims.

I claim:

1. An offshore tower adapted to rest upon the bed of a body of water with portions of the tower extending above the surface of the water, said tower comprising:

a plurality of upwardly extending, generally straight tubular legs spaced about a central vertical axis, said legs intermeditate the ends thereof intersecting a defined generally horizontal reference plane, said legs mutually diverging in directions upwardly and downwardly from said reference plane;

means rigidly connecting said legs for supporting said legs in fixed spaced relation to each other;

a base rigidly connecting the lower extremity of said legs, said base adapted to rest upon the bed of the body of water;

a plurality of hollow riser tubes positioned concentrically within said legs, each said riser tube adapted to be driven partially outwardly of the associated one of said legs into the bed of the body of water to moor thereto said base, each said riser tube adapted to receive a drill string to direct the associated drill string centrally of the tower to the other side thereof, said riser tube guiding the drill string outwardly of said base and downwardly into the bed at an inclination to the vertical; and

means for fixedly connecting each said riser tube with the associated one of said legs subsequent to mooring of said base to the bed.

2. An offshore tower adapted to rest upon the bed of a body of water with portions of the tower extending above the surface of the water, said tower comprising:

a plurality of upwardly extending, generally straight legs spaced about and disposed in a swirling pattern generally along the exterior surfaces of two mutually intersecting, oppositely directed upper and lower conoidal surfaces of revolution developed concentrically about a common vertical axis, the lower extremities of said legs being disposed in a generally horizontal base plane;

means rigidly connecting said legs for supporting said legs in fixed spaced relation to each other;

a base secured to and rigidly connecting the lower extremities of said legs, said base adapted to rest on the bed of the body of water, said base having a generally toroidal periphery disposed symmetrically about said vertical axis;

a plurality of nozzles secured to and disposed about the periphery of said base directed downwardly and outwardly therefrom; and

means for selectively directing fluid under pressure outwardly through selected ones of said nozzles to flush away underlying raised portions of the bed of the body of water to enable said base to rest horizontally upon the bed.

3. An offshore tower adapted to rest upon the bed of a body of water with portions of the tower extending above the surface of the water, said tower comprising:

a plurality of upwardly extending, generally straight legs spaced about and disposed in a swirling pattern generally along the exterior surfaces of two mutu-

ally intersecting, oppositely directed upper and lower conoidal surfaces of revolution developed concentrically about a common vertical axis, the lower extremities of said legs being disposed in a generally horizontal base plane;

means rigidly connecting said legs for supporting said legs in fixed spaced relation to each other;

a base secured to and rigidly connecting the lower extremities of said legs, said base adapted to rest on the bed of the body of water, said base having a generally toroidal periphery disposed symmetrically about said vertical axis;

a plurality of guide tubes, each of said guide tubes being secured to and spaced radially outwardly from each of said legs;

said base including a plurality of apertures extending through said base member adjacent each of said legs;

each of said guide tubes having a central passageway axially aligned with one of said apertures, said passageway and said aperture having their axes aligned generally parallel to the axis of the adjacent said leg,

said guide tubes and said passageways adapted to receive auxiliary leg members in spaced relation parallel to adjacent each of said legs.

4. An offshore tower adapted to rest upon the bed of a body of water with portions of the tower extending above the surface of the water, said tower comprising:

a plurality of upwardly extending, generally straight legs spaced about and disposed in a swirling pattern generally along the exterior surfaces of two mutually intersecting, oppositely directed upper and lower conoidal surfaces of revolution developed concentrically about a common vertical axis, the lower extremities of said legs being disposed in a generally horizontal base plane;

means rigidly connecting said legs for supporting said legs in fixed spaced relation to each other;

a base secured to and rigidly connecting the lower extremities of said legs, said base adapted to rest on the bed of the body of water, said base having a generally toroidal periphery disposed symmetrically about said vertical axis;

said base further including,
a hollow, peripherally extending chamber disposed symmetrically about the axis; and
means connected with said chamber for selectively filling and emptying said chamber with water, said chamber in an emptied condition providing sufficient buoyancy to cause said tower to float in the water.

5. An offshore tower defined in claim 4 wherein: each of said legs is tubular having a hollow interior

and open upper and lower extremities, said base further including sealing means for preventing fluid communication between the interior of each said leg and said hollow chamber in said base.

6. An offshore tower adapted to rest upon the bed of a body of water with portions of the tower extending above the surface of the water, said tower comprising:

a plurality of upwardly extending, generally straight legs spaced about and disposed in a swirling pattern generally along the exterior surfaces of two mutually intersecting, oppositely directed upper and lower conoidal surfaces of revolution developed concentrically about a common vertical axis, the lower extremities of said legs being disposed in a generally horizontal base plane;

means rigidly connecting said legs for supporting said legs in fixed spaced relation to each other;

a base secured to and rigidly connecting the lower extremities of said legs, said base adapted to rest on the bed of the body of water, said base having a generally toroidal periphery disposed symmetrically about said vertical axis; and

tubular riser means within at least one of said legs selectively movable partially outwardly and downwardly of said leg and adapted to penetrate an underlying portion of the bed to secure said base to the bed.

7. An offshore tower as defined in claim 1 wherein each said riser means includes an axially extending interior passageway adapted to guide a drilling string positioned interiorly of said riser means outwardly thereof into the underlying bed.

8. An offshore tower as defined in claim 4 wherein said chamber in said base is compartmented.

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U.S. Cl. X.R.