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PLUMBING DEVICE

Filed March 15, 1954

FIG. 2

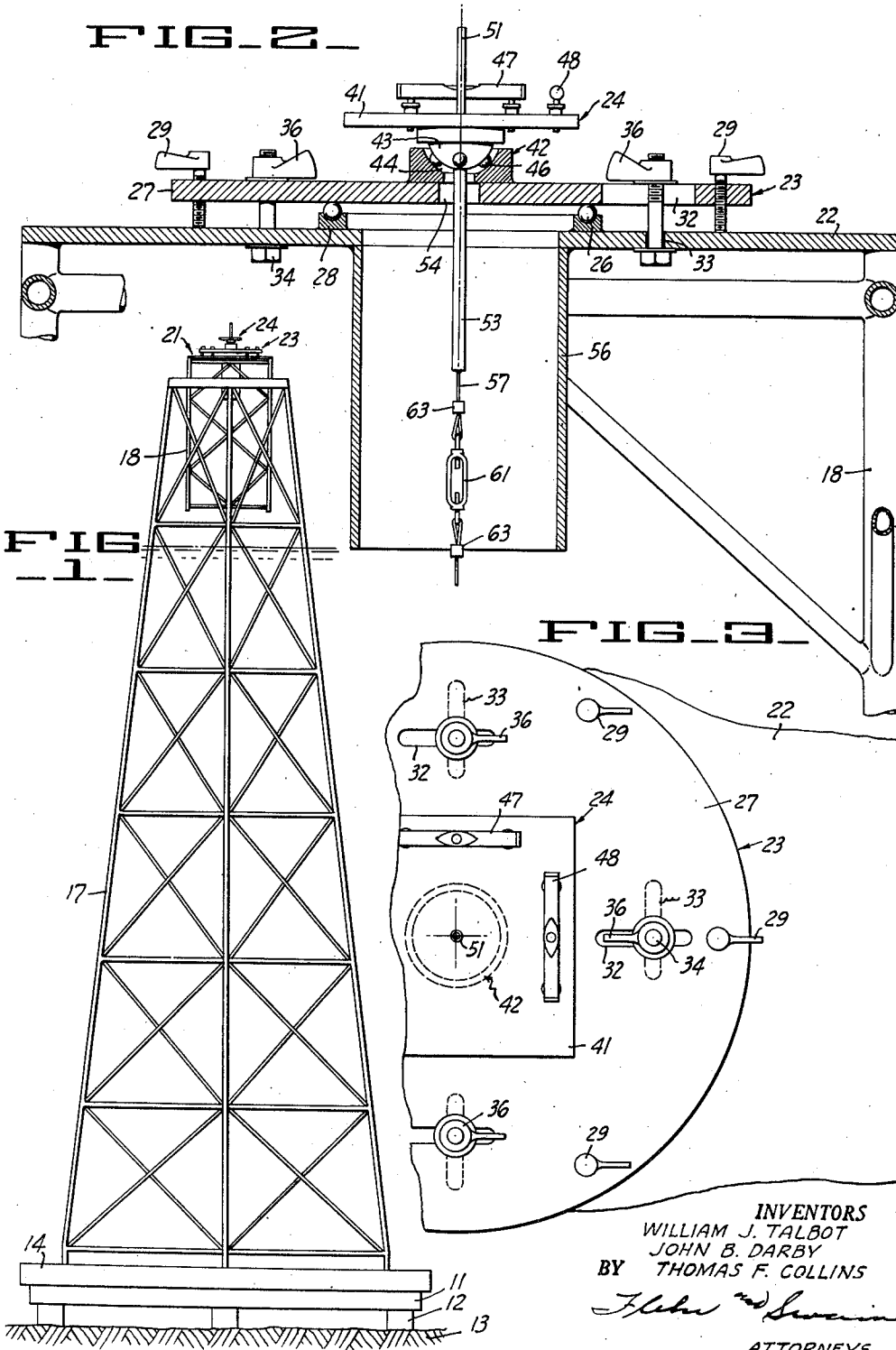
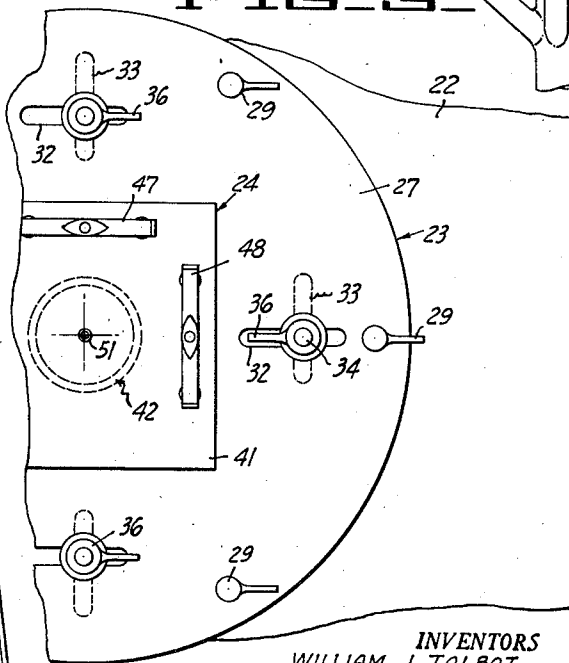


FIG. 1

FIG. 3



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PLUMBING DEVICE

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Application March 15, 1954, Serial No. 416,180

3 Claims. (Cl. 33—74)

This invention relates to plumbing devices and more particularly to plumbing devices for use in positioning underwater objects.

In setting underwater objects, particularly precast concrete units, difficulty has been experienced in determining whether these units have been properly positioned, especially where they are being placed in deep water. This difficulty is due to the fact that it has been hard to ascertain when a sighting rod positioned over the concrete unit is at a point which is directly over the center of the submerged unit.

In general, it is an object of the present invention to provide a plumbing device which will allow accurate determination of when a sighting rod is over the center of a submerged concrete unit.

Another object of the invention is to provide a plumbing device which will allow accurate determination of when a sighting rod is exactly vertical.

A further object of the invention is to provide a plumbing device which can be quickly and easily shifted to bring the sighting rod into a vertical position over the center of the submerged concrete unit.

Additional objects of the invention will appear from the following description in which the preferred embodiment has been set forth in detail in conjunction with the accompanying drawing.

Referring to the drawing:

Figure 1 is an elevation view showing our plumbing device in place upon a tower attached to a submerged concrete grid.

Figure 2 is a cross-sectional view of our plumbing device.

Figure 3 is a partial plan view of our plumbing device.

In one application of the present invention, precast concrete grids of the type disclosed in a co-pending application Serial No. 418,600, filed March 25, 1954, and entitled "Pier Construction and Method" are positioned to form foundations for concrete piers.

As shown in Figure 1 and as described in the above co-pending application, a precast grid 11 is lowered onto falsework piles 12 driven into the underwater formation 13. The grid 11 is lowered by means of lines attached to pickup beam 14 which is detachably connected to the grid 11.

A rigid tower 17 is mounted on the pickup beam 14 and is lowered at the same time as the concrete grid 11 is lowered. The upper portion of the tower 17 is provided with a tower extension 18 which is slidably mounted therein so that the tower extension may be moved in a vertical direction with respect to the tower.

On top of the tower extension 18, as shown in Figure 1, we have provided our plumbing device 21 consisting of a base 22 which forms a support for the positioning device 23 and the leveling mechanism 24. The base 22 may be attached to the tower extension 18 by any suitable means such as welding.

Any suitable means may be provided for slidably mounting the positioning device 23 with respect to the

base 22. One means found to be satisfactory consists of a plurality of ball bearings 26 which engage the bottom surface of a flat circular table 27. The ball bearings are carried by a circular race 28 mounted on the base 22.

The positioning device 23 is also supported above the base 22 by means of the screws 29 which are threaded into the outer periphery of the circular table 27.

To hold the table 27 in a fixed position with respect to the base 22, it is provided with a plurality of slots 32 which have longitudinal axes parallel to a diameter of the table 27, and the base 22 is also provided with longitudinal slots 33 which have longitudinal axes which intersect at right angles the longitudinal axes of the slots 32. Bolts 34 are inserted in the slots 33 and pass upwardly through the slots 32 and are engaged by wing nuts 36. It is apparent that the slots 32 and 33 allow longitudinal and transverse movement of the table 27 without removal of the bolts 34 merely by loosening nuts 36. Thus when the table 27 has been properly positioned, the wing nuts 36 can be tightened to lock the same in position.

The leveling mechanism 24 consists of a square plate 41 mounted upon a universal bearing 42 which is secured to the table 27. The universal bearing 42 consists of a semi-spherical ball 43 attached to the square plate 41 and is rotatably mounted in a socket 44 as by means of ball bearings 46.

A pair of levels 47 and 48 are mounted along two of the outer edges of the plate 41 in such a manner that one level is facing in a direction perpendicular to the direction that the other level is facing. A sighting rod 51 is mounted in the center of the plate 41 and perpendicular to the plate 41.

A rod 53 is attached to the bottom of the semi-spherical ball 43 and extends through the hole 54 in the table 27. A pipe sleeve 56 extends downwardly upon the base 22 and serves to protect the rod 53.

A plumbing wire 57 is attached to the rod 53 by any suitable means such as welding, and extends downwardly through the tower 17 and is attached to the center of the concrete grid 11. Any suitable means may be provided for tightening the wire 57, as for example, a turnbuckle 61. The plumbing wire 57 can be generally tightened by temporarily loosening clamps 63 and additional tension can be obtained by turning turnbuckle 61.

Operation of the device described above is as follows: As previously described, the tower 17 is rigidly attached to the grid 11 before it is lowered. Also before lowering, the plumbing device 21 is attached to the tower extension 18 and the plumbing wire 57 is secured to the center of the base grid 11 and tightened. Then the entire assembly, the grid, the tower, the tower extension, and the plumbing device, is lowered into approximate position on top of the falsework piles 12. Additional tension may then be applied to the plumbing wire 57 if the wire 57 is not taut enough by means of the turnbuckle 61.

If the plumbing wire 57 attached to the sighting rod 51 is truly vertical, that is, if the sighting rod is directly over the center of the base grid 11, both levels 47 and 48 will read "level." However, if the plumbing wire is not truly vertical, that is, that the sighting rod is not actually over the center of the base grid, this is indicated by levels 47 and 48. In such event, the plate 41 has been tilted relative to table 27 by movement of the ball 43 in socket 44 which is caused by movement of rod 53 by plumbing wire 57. Thus to secure a "level" reading, the positioning device 23 must be shifted until the plumbing wire 57 is exactly vertical whereupon the ball 43 will be rotated to bring the rod 51 into vertical alignment.

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The positioning device 23 is shifted laterally or longitudinally by loosening the wing nuts 36 and moving the table 27 on ball bearings 26. Movement is continued until both levels 47 and 48 read "level" and then the table 27 is locked into position by tightening the wing nuts 36.

When the levels 47 and 48 indicate that the plate 41 is in a horizontal position with respect to the earth, the plumbing wire 57 and the sighting rod 51 will be truly vertical and the sighting rod 51 will be exactly over the center of the base grid 11. At this time an accurate sight can be taken on the sighting rod to check the position of the grid. If the grid 11 is not properly placed, then it can be shifted and the operation repeated to check the new position. Ultimately, the grid will be accurately positioned to thereby facilitate the erection of accurately aligned piers.

After the base grid has been properly placed, the tower 17, the tower extension 18, and the plumbing device 21 are removed by detaching the pickup beam 14 from the base grid and lifting the entire assembly out of the water. The assembly may then be used for placing and aligning another base grid.

We claim:

1. In a plumbing device for positioning an underwater object, a tower mounted on said object and extending above the surface of the water, a sighting element mounted on said tower, an elongated tension element connecting said sighting element to a predetermined point on said object, means for moving said sighting element in a horizontal plane with respect to said tower, and means for determining when the elongated tension element is exactly vertical with respect to said predetermined point on said object.

2. In a plumbing device for positioning an underwater object, a tower mounted on said object and extending above the surface of the water, a table mounted on said tower, means for moving said table in a substantially

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horizontal plane with respect to said tower, a sighting element, means for pivotally mounting the lower ends of said sighting element above said table, an elongated tension element connecting said sighting element to a predetermined point on said object whereby as said table is moved in a horizontal plane said sighting rod will be pivoted about its lower end and means mounted on said table for determining when the elongated tension element is exactly vertical with respect to said predetermined point on said object.

3. In a plumbing device for positioning an underwater object, a tower mounted on said object and extending above the surface of the water, a table mounted on said tower, means for moving said table in a substantially horizontal plane with respect to said tower, a universal bearing having a ball and socket, said socket being mounted on said table, an elongated tension element connecting the ball of said universal bearing to a predetermined point on said object, a sighting element mounted on said ball in a line coincident with a line formed by said elongated tension element whereby when said table is moved in a horizontal plane said ball will be rotated to cause the pivotal movement of said sighting rod, and level means mounted on said table for determining when the elongated tension element is exactly vertical with respect to said predetermined point on said base.

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