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(54) **Anchoring arrangement**

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Description

FIELD OF THE INVENTION

[0001] The invention relates to an anchoring arrangement for anchoring an object, such as a container and/or a pipe to be embedded into the ground.

BACKGROUND OF THE INVENTION

[0002] Containers to be embedded into the ground, such as waste containers or oil tanks, tend to rise upwards. In particular, the water outside a container causes buoyancy that tries to lift the container upwards. The risk that the container will rise is particularly high in watery areas and in groundwater areas as well as in connection with heavy rains. In particular, when the container is empty, the buoyancy caused by the water outside the container is easily greater than the weight of the fluid inside the container. The rising of containers upwards may damage them and the pipes connected to the containers may break, as a result of which the fluid inside the container may spill into the surrounding ground.

[0003] Containers are typically anchored in place. The anchoring is typically implemented by digging a pit for the container to be embedded and by casting a concrete slab in the pit on site. The total weight of the slab and the earth on top of it usually equals the weight of the amount of water corresponding at least to the container volume. In connection with concreting, fastening loops made of steel are mounted in the slab. The container is arranged on top of the concrete slab and anchored to the fastening loops with wires or ropes. Implementation of concreting is relatively laborious and constitutes an additional step in the installation of the container. For example, the weather may complicate the implementation of concreting considerably. In addition, the pit dug for the container may be so deep that groundwater, for instance, accumulates in it. In that case, the groundwater needs to be pumped out of the mounting pit before casting. All in all, casting increases complexity considerably and causes difficulties. Instead of the casting in-situ, concrete slabs can be manufactured in advance, but transportation of large concrete slabs from the manufacturing site to the installation site is very difficult and expensive.

[0004] Finnish patent 941128 discloses a method and an arrangement for anchoring a container to be embedded into the ground, where the container is anchored in place by means of a mat-like anchoring means. The longitudinal centre of the mat-like anchoring means is positioned substantially on the longitudinal centre line of the container, in which case the anchoring means is spread downwards from the top of the container to extend along the sides of the container towards the pit edges and further upwards. A lower layer of earth fill is piled into the groove that is formed by the anchoring means, the ends of the anchoring means are folded onto the top of this layer and an upper layer of earth fill is piled on top of

them. This kind of anchoring arrangement requires that the mat-like anchoring means be dimensioned appropriately to fit the container. Furthermore, the anchoring means has to be installed accurately in a certain point.

5 The installation includes relatively many phases and is difficult to implement.

[0005] US-B-6 345 933 discloses an anchoring arrangement for anchoring an underground storage tank.

10 BRIEF DESCRIPTION OF THE INVENTION

[0006] The object of the invention is to provide a simple anchoring arrangement that is relatively easy to install.

[0007] The anchoring arrangement of the invention is characterized in that the anchoring arrangement includes at least two discrete anchoring plates to be respectively arranged on each opposite side of the object to be anchored and a binding means, which is arranged to respectively connect two anchoring plates located at opposite sides of the object to be anchored and extend over said object, and to prevent the object to be anchored from rising and moving, a layer of earth is arranged on top of the anchoring plates.

[0008] The basic idea of the invention is that the anchoring arrangement comprises at least two pairs of anchoring plates that are arranged on different sides of the object to be anchored. The anchoring plates are connected to each other by a connecting means that extends over the object to be anchored. The anchoring plates are placed in the same pit as the object to be anchored and a layer of earth is arranged on top of them. The anchoring plates are mounted so deep that the weight of the layer of earth on top of the anchoring plates prevents the object to be anchored from rising due to water's buoyancy. This kind of anchoring arrangement can be easily transported together with a container, for example, and the anchoring arrangement is also relatively simple and easy to install in place. The anchoring plates may be similar in connection with containers and pipes of different sizes, but in connection with large containers and pipes, more anchoring plates are installed or they are installed more frequently. The suitable number of anchoring plates can be determined according to the need on the basis of the volume of the object to be anchored and the anchoring area of the anchoring plates as well as on the basis of the weight and volume of the earth mass to be piled on top of the plates.

[0009] The idea of an embodiment is that an anchoring plate is provided with protrusions and/or ribs, for which reason, for instance, the edges of the anchoring plate are shaped to point upwards. The anchoring plate is preferably provided with a cup-shaped and ribbed structure on its both sides. This ensures that the layer of earth stays on top of the anchoring plate and the anchoring plate cannot move sideways and slip upwards.

BRIEF DESCRIPTION OF THE FIGURES

[0010] The invention will be described in greater detail in the accompanying drawings, in which

Figure 1 schematically illustrates an anchoring arrangement of a container,

Figure 2 is a schematic exploded view of the anchoring plate and a grip fastener to be attached to it, and

Figure 3 is a schematic cross-sectional side view of another anchoring plate.

For the sake of clarity, the figures illustrate the invention in a simplified manner. In the figures, like reference numbers indicate like parts.

DETAILED DESCRIPTION OF THE INVENTION

[0011] Figure 1 illustrates a container 1. The container 1 may be, for example, a waste water container, an oil tank, a septic tank or another container to be embedded into the ground. The container 1 is anchored to stay in place so that the water that accumulates outside the container, for example, does not cause buoyancy that would rise or otherwise move the container 1. The anchoring arrangement comprises anchoring plates 2, which in the case of Figure 1 are arranged on different sides of the container 1 by placing two anchoring plates 2 on both sides of the container 1. The two anchoring plates 2 on the different sides of the container 1 are connected to each other by a binding means 3 that travels via the top of the container 1. The binding means 3 is attached to a grip fastener 4 provided in the anchoring plate. The binding means 3 may be, for example, a wire or a rope. In addition, the binding means 3 may be a band or a strap. A load strap is a handy binding means 3. A load strap is used in transportation to keep the goods to be transported in place in a trailer or in the transportation space of a vehicle. This kind of load strap comprises tightening means by which it can be tightened easily to a suitable tightness also when it is used as a binding means 3. The width of the load strap may be 35 mm, for example, in which case the upper surface of the container is not subjected to sharp load peaks.

[0012] The anchoring is implemented by first digging a pit for the container 1. The container 1 is placed in the pit. A necessary number of anchoring plates 2 are placed in the same pit with the container 1. The anchoring plates 2 are connected to each other by a binding means 3 by joining the anchoring plate 2 on a first side of the container to at least one other anchoring plate 2 on the other side of the container. If desired, the anchoring plate 2 can also be connected to more than one anchoring plate 2 by the binding means 3. After this, a layer of earth with a thickness of 20 cm, for example, is arranged on top of the anchoring plates. The thickness of the layer of earth depends on its weight and on the size of the anchoring plate 2. The layer of earth should be sufficiently thick and heavy

so that the binding means 3 can be tightened sufficiently firmly. After adding the layer of earth, the binding means 3 are tightened so that they are firmly against the upper surface of the container 1. After this, the pit is filled with a layer of earth up to the desired level. Typically, the container 1 is covered so that only part of the rising pipe 5 of the container 1 remains visible.

[0013] A large container naturally requires a different anchoring arrangement than a small container. It is, however, possible to respond to different anchoring needs by using similar parts in the arrangement, i.e. the anchoring plates 2 may have the same size in different anchoring arrangements. The number of anchoring plates 2, however, is determined according to the magnitude of the buoyancy to which the container is subjected. In connection with a small container, four anchoring plates, for example, may be sufficient, whereas a larger container 1 may require six or eight or even more anchoring plates 2. Similarly, the installation depth of the anchoring plates 2 affects the number of anchoring plates 2 needed. For example, four plates with a diameter of 60 cm are needed for a 2000-liter container when the installation depth is 1.5 m. In that case, the binding means 3 has to sustain a force of at least 10 kilonewtons. The binding means 3 must also be made of a material that does not perish when buried in the ground. The binding means 3 may be made of polyamide, for instance. In addition, to ensure steadiness of the anchoring arrangement, it is advisable to arrange the anchoring plates 2 below the centre line of the container 1. The anchoring plates 2 need not be particularly heavy since the weight of the earth on top of the anchoring plates 2 ensures that the plates 2 stay in place. The anchoring plates on the different sides of the container 1 can be connected to each other crosswise as shown in Figure 1, or the binding means 3 may extend directly over the container 1 such that the anchoring plate on the first side of the container 1 at its front end is connected to the anchoring plate on the other side of the container 1 at its front end, and correspondingly, the anchoring plates at the rear end of the container 1 on its different sides are connected to each other.

[0014] Figure 2 illustrates an anchoring plate 2 and a grip fastener 4 to be attached to it. The anchoring plate 2 is provided with a hole, through which the lower part of the grip fastener is pushed. A plate 7 has been welded to the grip fastener, preventing the grip fastener 4 from extending too far through the hole 6. A nut 8 is screwed to the lower part of the grip fastener. A base plate 9 is arranged between the nut 8 and the anchoring plate 2. The base plate 9 and the plate 7 are tightened firmly against the anchoring plate 2 by the nut 8, in which case the grip fastener 4 is fixed firmly to the anchoring plate 2 so that it does not swing.

[0015] The grip fastener 4 can also be formed such that the plate 7 is welded to its lower end and the hole 6 is shaped to allow the grip loop 10 of the grip fastener 4 through the hole 6. Naturally, the plate 7 does not fit through the hole 6. In that case, the grip fastener can be

passed through the anchoring plate 2 from below, in which case the plate 7 remains under the anchoring plate and the grip loop above the anchoring plate 2. Thus no nut is needed in this case to fasten the grip fastener. The grip fastener 4 stays in place eventually when the binding means 3 are tightened against the upper surface of the container 1.

[0016] Figure 3 illustrates an anchoring plate 2. In the case of Figure 3, the grip fastener 4 is manufactured as an integral part of the anchoring plate 2 during the manufacture of the plate 2. The anchoring plate can be formed by means of injection moulding, for example. The material of the anchoring plate 2 may be, for example, plastic, such as polyethylene PE, polypropylene PP or polyvinylchloride PVC. The surface of the anchoring plate may be provided with ribs 11 or other similar irregularities, grooves or protrusions. The rib 11 may be circular, for example, if the anchoring plate is also round. The anchoring plate 2 may also be provided with radial ribs as well as with other kind of ribs. Furthermore, the edge of the anchoring plate 2 may be shaped to point upwards, i.e. the anchoring plate 2 is cup-shaped as shown in Figure 3. Because of the edge 12, the earth placed on top of the anchoring plate stays on top of it, i.e. the anchoring plate cannot move sideways or turn and rise upwards. The primary purpose of the ribs 11 is to stiffen the structure of the anchoring plate 2, but the ribs or other similar irregularities also prevent the anchoring plate 2 from moving sideways in the ground. Preferably, the lower surface of the anchoring plate 2 may also be provided with ribs 11 or other irregularities. In addition, the anchoring plate 2 is preferably cup-shaped on its both sides, i.e. the edge 12 is shaped to point both upwards and downwards.

[0017] The drawing and the related description are only intended to illustrate the inventive concept. The details of the invention may vary within the scope of the claims. In addition to a container 1, the anchoring arrangement can be used for anchoring pipes to be mounted into the ground.

Claims

1. An anchoring arrangement for anchoring an object, such as a container and/or a pipe to be embedded into the ground, **characterized in that** the anchoring arrangement includes at least two discrete anchoring plates (2) to be respectively arranged on each opposite side of the object to be anchored and a binding means (3), which is arranged to respectively connect two anchoring plates (2) located at opposite sides of the object to be anchored and extend over said object, and to prevent the object to be anchored from rising and moving, a layer of earth is arranged on top of the anchoring plates (2).
2. An anchoring arrangement according to claim 1,

characterized in that to prevent the anchoring plate and the layer of earth from moving with respect to each other, at least one end of the anchoring plate (2) is provided with irregularities.

3. An anchoring arrangement according to claim 1 or 2, **characterized in that** the anchoring plate (2) is cup-shaped.
4. An anchoring arrangement according to any one of the preceding claims, **characterized in that** the anchoring plate (2) is made of plastic.
5. An anchoring arrangement according to any one of the preceding claims, **characterized in that** the anchoring plate (2) is provided with ribs.

Patentansprüche

1. Verankerungsanordnung zum Verankern eines Objekts, wie z.B. eines in den Boden einzubettenden Behälters und/oder Rohrs, **dadurch gekennzeichnet, dass** die Verankerungsanordnung mindestens zwei diskrete Verankerungsplatten (2), die jeweils auf jeder gegenüberliegenden Seite des zu verankernden Objekts anzuordnen sind, und eine Verbindungseinrichtung (3) aufweist, die jeweils zum Verbinden zweier auf einander gegenüberliegenden Seiten des zu verankernden Objekts befindlichen Verankerungsplatten (2) vorgesehen ist und über das Objekt verläuft, wobei eine Erdschicht oben auf den Verankerungsplatten (2) angeordnet ist, um zu verhindern, dass das zu verankernde Objekt hochsteigt und sich bewegt.
2. Verankerungsanordnung nach Anspruch 1, **dadurch gekennzeichnet, dass** zum Verhindern, dass sich die Verankerungsplatte und die Erdschicht relativ zueinander bewegen, mindestens ein Ende der Verankerungsplatte (2) Unregelmäßigkeiten aufweist.
3. Verankerungsanordnung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Verankerungsplatte (2) becherförmig ausgebildet ist.
4. Verankerungsanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Verankerungsplatte (2) aus Kunststoff gefertigt ist.
5. Verankerungsanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Verankerungsplatte (2) mit Rippen versehen ist.

Revendications

1. Dispositif d'ancrage pour ancrer un objet tel qu'un container ou un tuyau qui doit être disposé sur le fond, **caractérisé en ce que** le dispositif d'ancrage comprend au moins deux plaques d'ancrage distinctes (2) à disposer respectivement sur chaque côté opposé de l'objet à ancrer et un moyen de fixation (3), prévu pour être connecté respectivement aux deux plaques d'ancrage (2) disposées de chaque côté de l'objet à ancrer, et qui s'étend au-delà dudit objet, et une couche de terre est disposée sur le dessus des plaques d'ancrage (2) pour éviter que l'objet qui doit être ancré se soulève et se déplace.
2. Dispositif d'ancrage selon la revendication 1, **caractérisé en ce que**, pour éviter que la plaque d'ancrage et la couche de terre se déplacent l'un par rapport à l'autre, au moins une extrémité de la plaque d'ancrage (2) comporte des irrégularités.
3. Dispositif d'ancrage selon la revendication 1 ou la revendication 2, **caractérisé en ce que** la plaque d'ancrage (2) à la forme d'une coupe.
4. Dispositif d'ancrage selon une quelconque des revendications précédentes, **caractérisé en ce que** la plaque d'ancrage (2) est faite en matière plastique (5).
5. Dispositif d'ancrage selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la plaque d'ancrage (2) comporte des côtes.

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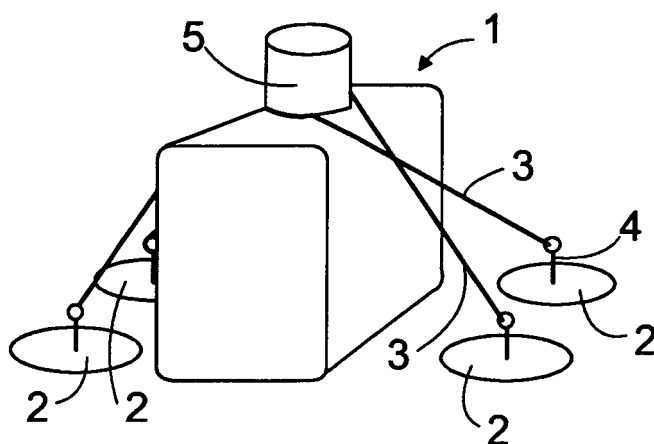


FIG. 1

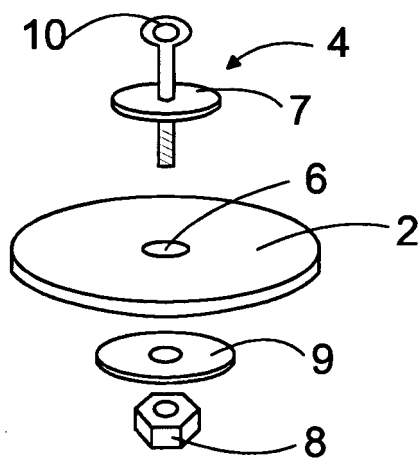


FIG. 2

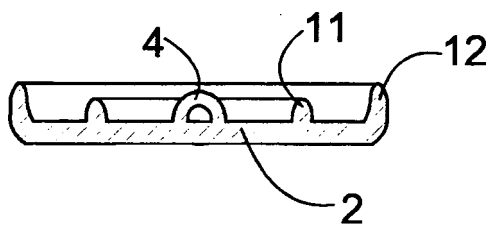


FIG. 3