

[54] **WEIGHTED CLAMP FOR HANDLING
BUOYANT MATERIALS UNDER WATER**

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294/104; 24/248 D; 29/238, 269; 269/6, 228

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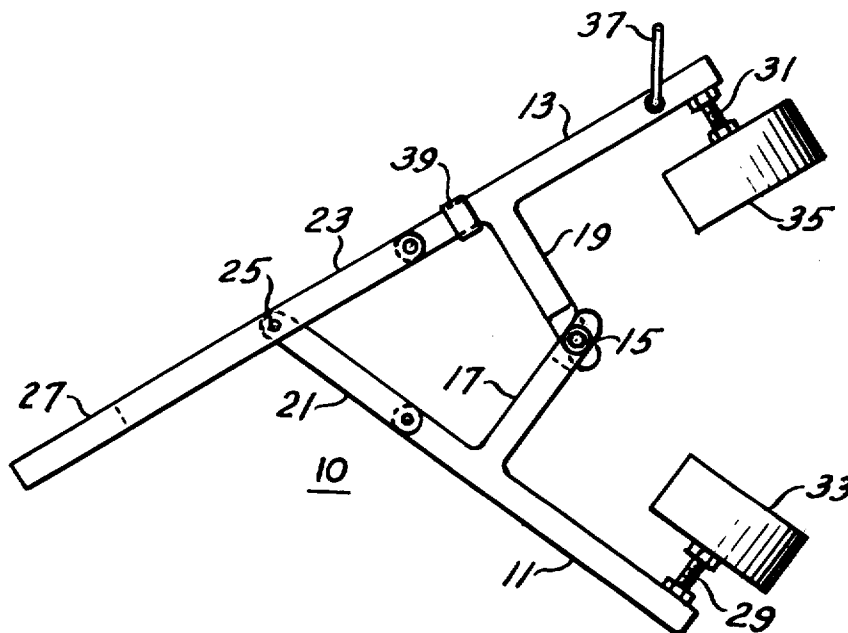
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ABSTRACT

A clamp having opposed weighted clamping jaws is used for gripping and weighting buoyant foam plastic shapes to facilitate assembly and positioning of such shapes under water by divers engaged in jacketing underwater piling against corrosion.

4 Claims, 3 Drawing Figures



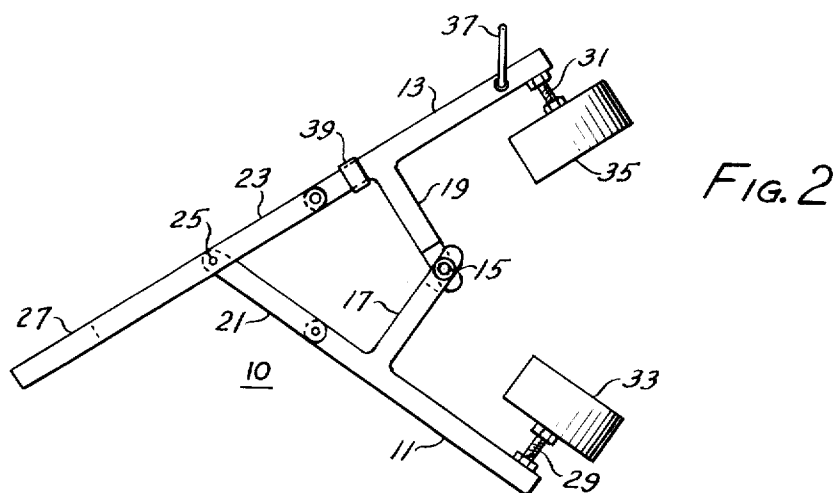
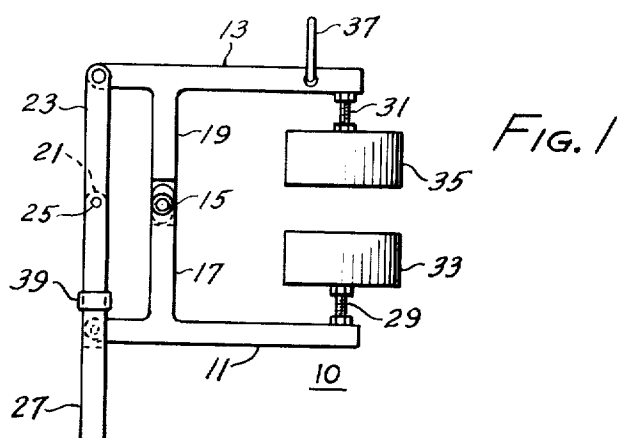
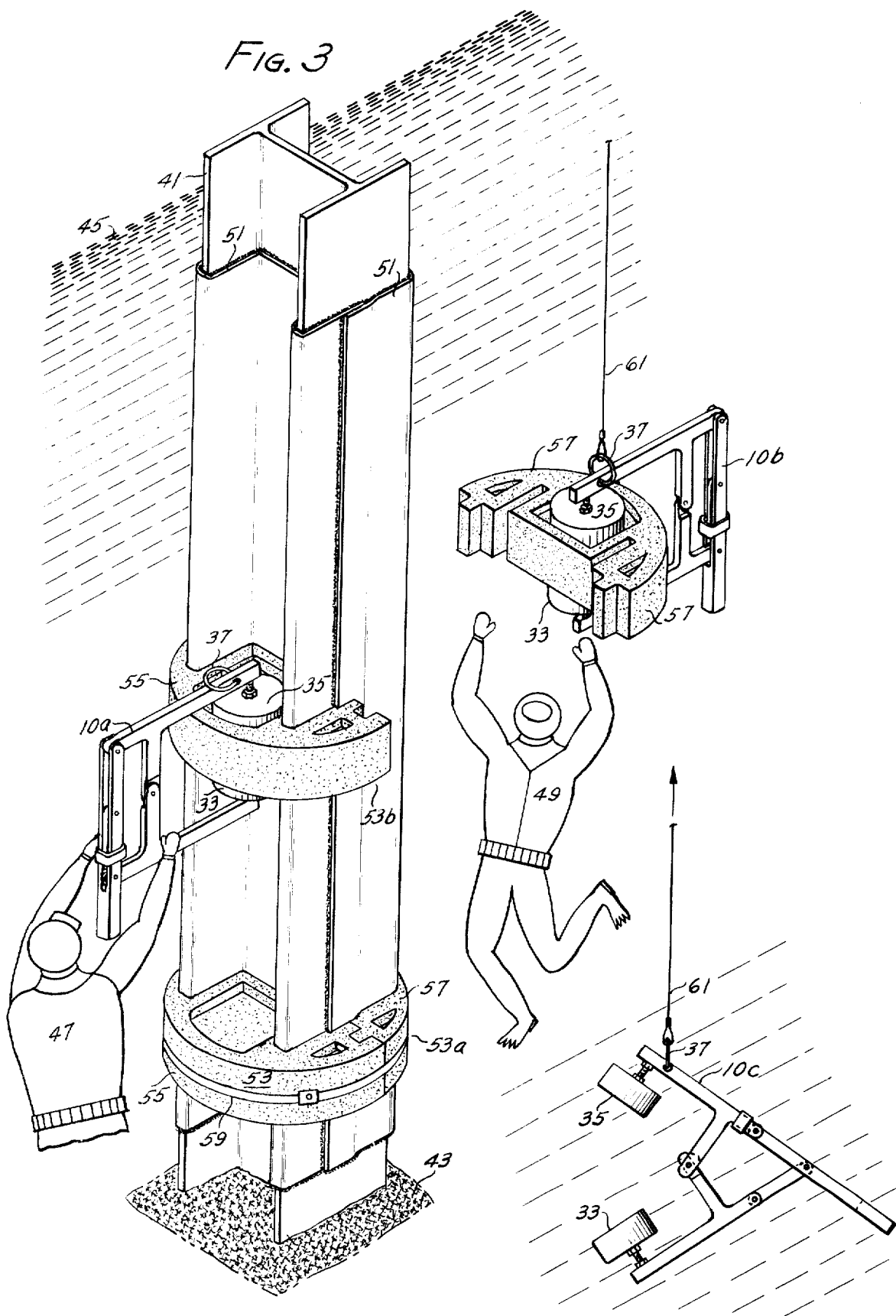


FIG. 3



WEIGHTED CLAMP FOR HANDLING BUOYANT MATERIALS UNDER WATER

BACKGROUND OF THE INVENTION

This invention relates to the handling of buoyant objects under water and is directed more particularly to the provision of clamp type weighting means for the handling of buoyant foam plastic shapes used in connection with underwater jacketing of metal piles against corrosion.

Metal piles and especially H-beam and I-beam type metal piles are frequently used in underwater environments for the support of docks, wharves, piers, drilling platforms and other marine structures. As is well known, such metal piles, like other metal objects, are subject to corrosion in underwater and semi-underwater environments. Piling exposed to semi-underwater environments such as in the so-called splash zone are particularly liable to severe corrosion. There have been many suggested manners of eliminating or decreasing such corrosion. One such manner has been to coat the piling with a corrosion resistant jacket

One particularly effective jacketing system has been described in an application for patent in the names of G. V. Fehr and J. F. Gosse entitled "Method for Protecting Metal H-Piling in Underwater Environments and Protected H-Piling," Ser. No. 431,814 which application is being filed concurrently with the present application on Jan. 8, 1974. In the coating or jacketing system described in the referred-to application plastic shield members having a shape conforming with the outside of the piling to be coated, which may be an H or I-beam type piling or other irregularly shaped piling, are coated on their inside surfaces with a corrosion resistant coating and passed to divers who assemble several of the shields about the piling in the form of an external jacketing. The shield members have a density fairly near to the density or specific gravity of water and thus are convenient for the divers to handle under water. A series of light foam plastic collars are then clamped at spaced intervals about the exterior of the piling over the corrosion shield members in order to hold the shield members tightly against the surface of the piling, particularly, in the case of an H or I-beam piling, between the flanges and against the web of the piling. The foam plastic clamping members have a very low specific gravity and are thus very buoyant and difficult for a diver to handle under water. Mechanical clamping means is thus almost a necessity to grasp the plastic clamping members and deliver them to the divers for positioning and assembly about the piles. There have previously been many types of clamps available both for surface manipulation and underwater manipulation of objects. None has been found, however, to be effectively designed for efficient handling underwater of very light buoyant objects, and particularly buoyant foam plastic collars or other very buoyant sections by a diver and especially by free-swimming divers such as divers using skuba type diving gear.

SUMMARY OF THE INVENTION

The foregoing difficulties associated with the handling of buoyant foam plastic collars or other sections under water by divers have now been obviated by the present invention. In accordance with the present invention there is provided a clamp which may be easily secured to the outer surface of a buoyant member

above the surface of a body of water and then lowered while clamped to the buoyant member to a diver working under water. The contact portions of the jaws of the clamp are weighted so that the center of gravity and the center of buoyancy of the combined clamp and plastic shape are either coincident or very nearly coincident or at least sufficiently close together so as to allow expeditious manipulation of the foam or expanded plastic shapes under the water with a minimum exertion of force. The clamp is preferably formed of two jaw mounting members pivoted together at the intersection of an extension from each. A pivoting toggle arrangement with a coextensive lever on one element of the toggle at the top of the clamp provides an effective means for opening and closing the clamp. The weighted jaws of the clamp are preferably adjustably mounted through the action of a helical screw type connection with the pivoted sections of the clamp.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of the clamp of the invention in closed and locked position.

FIG. 2 is a side view of the clamp of the invention in an open position.

FIG. 3 is a perspective view of several clamps constructed in accordance with the invention being used to position buoyant plastic foam collar members about an H-beam type piling.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIGS. 1 and 2 there is shown a clamp 10 designed for underwater use comprised of two jaw mounting members 11 and 13 pivoted together at a point 15 at the intersection of extensions 17 and 19 which extend at right angles from the mounting members 11 and 13 respectively. Preferably the intersecting portions of the extensions 17 and 19 are each decreased in thickness and rounded at the ends as shown in order to facilitate the production of a smoothly operating hinged joint with a minimum amount of mechanical play. A bolt with mounting washers is shown in service as the interconnecting pin and axis about which the extensions pivot. It will be understood that any suitable type of hinge or pivot connection could be used to pivotally connect the extensions 17 and 19 together. It will also be understood that the extensions 17 and 19, while shown extending at right angles from the jaw mounting members 11 and 13 respectively, could equally as well extend at some other angle from the jaw mounting members so long as the interconnecting pivot point is sufficiently offset from the jaw mounting members to effect proper spacing and opening of the jaws of the clamp 10.

The outer extremities of the jaw mounting members 11 and 13 are hingedly connected to two toggle links 21 and 23 respectively. The toggle links 21 and 23 are in turn hingedly connected to each other in the center of clamp 10 at 25 in order to provide a second pivoted hinge connection interconnecting the jaw mounting members 11 and 13. An extension of toggle 23 from the hinge point 25 serves as a convenient handle and operating lever 27 through which the jaw mounting members 11 and 13 may be pivoted about the point or pivot point 15 through the pivot or toggle action of the toggle links 21 and 23.

The inner ends of the jaw mounting members 11 and 13 have helical screw type mounting means 29 and 31 provided at right angles to the members 11 and 13. Weighted jaws 33 and 35 are adjustably mounted upon the helical mounting means 29 and 31 respectively, in position to contact and forcibly grip the buoyant objects which are to be handled when the jaw mounting members are closed and the weighted jaws 33 and 35 are correctly adjusted upon the helical screw mounting means. The weighted jaws 33 and 35 have depressions or orifices, not shown, in their surfaces into which the helical screw means 29 and 31 pass as the weighted jaws are adjusted upon said screw means. It will be understood that this adjustment may be accomplished in any one of a number of ways. For instance, the internal orifice in the weighted jaw may be threaded to interengage with the screw means, the threaded means may pass through an internally threaded bracket or mounting which is in turn secured to the weighted jaw before the screw passes into the orifice in the weighted jaw, or, as a further alternative, the threaded device may be secured directly into or upon the weighted jaw and adjustably screwed into a threaded fitting or mounting secured to the end of the jaw mounting members 11 and 13. Preferably the weighted jaws 33 and 35 will be removable from the jaw mounting members so that different weights and sizes of jaws may be interchanged to accommodate buoyant objects having different degrees of buoyancy and different sizes.

The weighted jaws shown in FIGS. 1 and 2 may be replaced by clamping jaws having separate weights associated therewith to overcome the buoyancy of the object to be handled under water. The weights should be arranged so that the effective weight is distributed evenly and concentrated in the jaws of the clamp so that the center of gravity of the clamp is either between the jaws or effectively adjacent to an axis or line passing through the two jaws. It will be seen that in the preferred embodiment of the clamp of the invention shown in the FIGURES, in which the clamping jaws and associated weights are coextensive, the center of gravity of the clamp will be near a line passing between the centers of the jaws, the distance of this center of gravity from the jaws varying with the relative weight of the jaws with respect to the remainder of the clamp structure. It is preferable for the major weight of the clamp to be concentrated in the jaws themselves. This arrangement is desirable since by having the center of gravity of the clamp in or near the jaws, and also by having the principal weight of the clamp concentrated in the jaws, the handling of objects under water is improved not only by having the center of gravity of the normally buoyant objects at or near the center of buoyancy of the object, but by having the weight centrally concentrated. Central concentration of the weight serves to decrease the inertia of the clamp-object combination to movements about the center of gravity and center of buoyancy. This arrangement considerably facilitates turning and manipulation of a buoyant object under water.

In gripping a buoyant object it is desirable, of course, in order to take proper advantage of the design of the clamp, to secure the jaws 33 and 35 as close to the center of buoyancy of the object to be manipulated as possible. Preferably the jaws would be secured on both sides of the center of buoyancy. The surfaces of the jaws will preferably be corrugated or roughened so that

the object being handled will have little opportunity to shift within the jaws as the object is being handled and positioned under water.

A securing ring 37 is attached to the clamp for use in attaching a line to the clamp for lowering to divers working under water. A sliding ring 39 may be used to lock the clamp in gripping position by sliding the ring over the base of the handle 27 and the adjacent toggle section 21.

FIG. 3 illustrates the use of the preferred embodiment of the clamp of the invention, as shown in FIGS. 1 and 2, underwater. There is shown in FIG. 3 a piling 41, which as shown is an H-type piling driven into the bottom 43 of a body of water 45.

Divers 47 and 49 have assembled shields or jacketing members 51 about the H-beam and are applying buoyant plastic foam clamping collars 53 about the jacketed H-beams to press the shield or jacketing members against the surface of the H-beam. Each collar 53 is composed of two interengaging sections 55 and 57. Two such sections have already been assembled about the H-beam as collar 53a, the two sections being secured together by strapping 59. Another section 55 of a second clamping collar 53b is seen being held in place by one diver 47 who is manipulating the collar section by means of a clamp 10a according to the present invention. A second section 57 of the second collar 53b is being lowered by means of a line 61 attached to the ring 37 of the clamp 10b to a second diver 49. A third clamp 10c, which has been opened to remove one of the previously installed collar sections, is shown being hoisted out of the water for reuse in lowering and manipulating a further clamp section; not shown.

It will be noted that the weighted jaws 33 and 35 of the clamps 10a and 10b are clamped to the buoyant expanded plastic sections near the center thereof in depressions on the surfaces of the sections. This clamping point is very near the center of buoyancy of the expanded plastic sections.

I claim:

1. An improved weighted clamping means for gripping and manipulating buoyant objects under water comprising:

- a. clamping jaw members arranged for movement toward and away from each other and adapted to grippingly contact opposite portions of said buoyant objects,
- b. individual weighted means directly and rigidly associated with said jaw members and constituting a major portion of the weight of the clamping means positioned with respect to the remainder of the clamp structure such that the center of gravity of the clamping means is closely adjacent to a line passing between the jaw members such that when the jaw members are in clamping relationship with said buoyant objects the center of gravity of said clamping means and buoyant objects together is closely adjacent to the center of buoyancy of said objects,
- c. pivoted jaw mounting means upon one end of which the jaw members are mounted and arranged to move said jaw members inwardly to a clamping position in response to activation of a toggle means connected to an opposite portion of said jaw mounting means.

2. The improved weighted clamping means of claim 1 wherein the jaw members recited in subparagraph (a)

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of claim 1 and the weighted means recited in subparagraph (b) of claim 1 are coextensive.

3. The improved weighted clamping means of claim 2 in which at least one of the said jaw members recited in subparagraph (a) of claim 1 are adjustably mounted with respect to said pivoted jaw mounting means through the agency of helical screw type adjusting means by which said coextensive jaw member and

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weighted means is adjustably secured to said jaw mounting means.

4. The improved weighted clamping means of claim 1 wherein the weighted means recited in subparagraph (b) of claim 1 is positioned along a line passing between the centers of the jaw means recited in subparagraph (a) of claim 1.

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