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(54) **CORROSION RESISTANT PRESTRESSED CONCRETE FLOAT SYSTEM**

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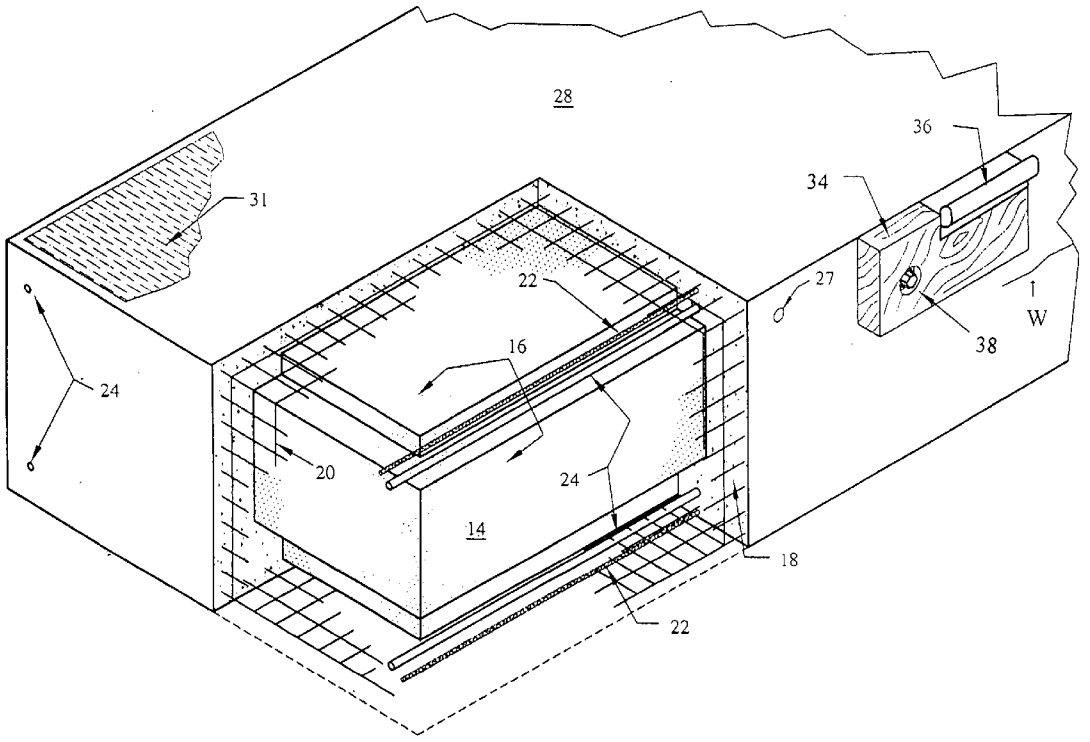
(57) **ABSTRACT**

A corrosion resistant prestressed float unit including a buoyant core encased within a polymeric coating, concrete encasing the core and polymeric coating, a corrosion resistant mesh to reinforce the concrete, and a plurality of corrosion resistant pretensioned fiber members extending the entire length of the unit.



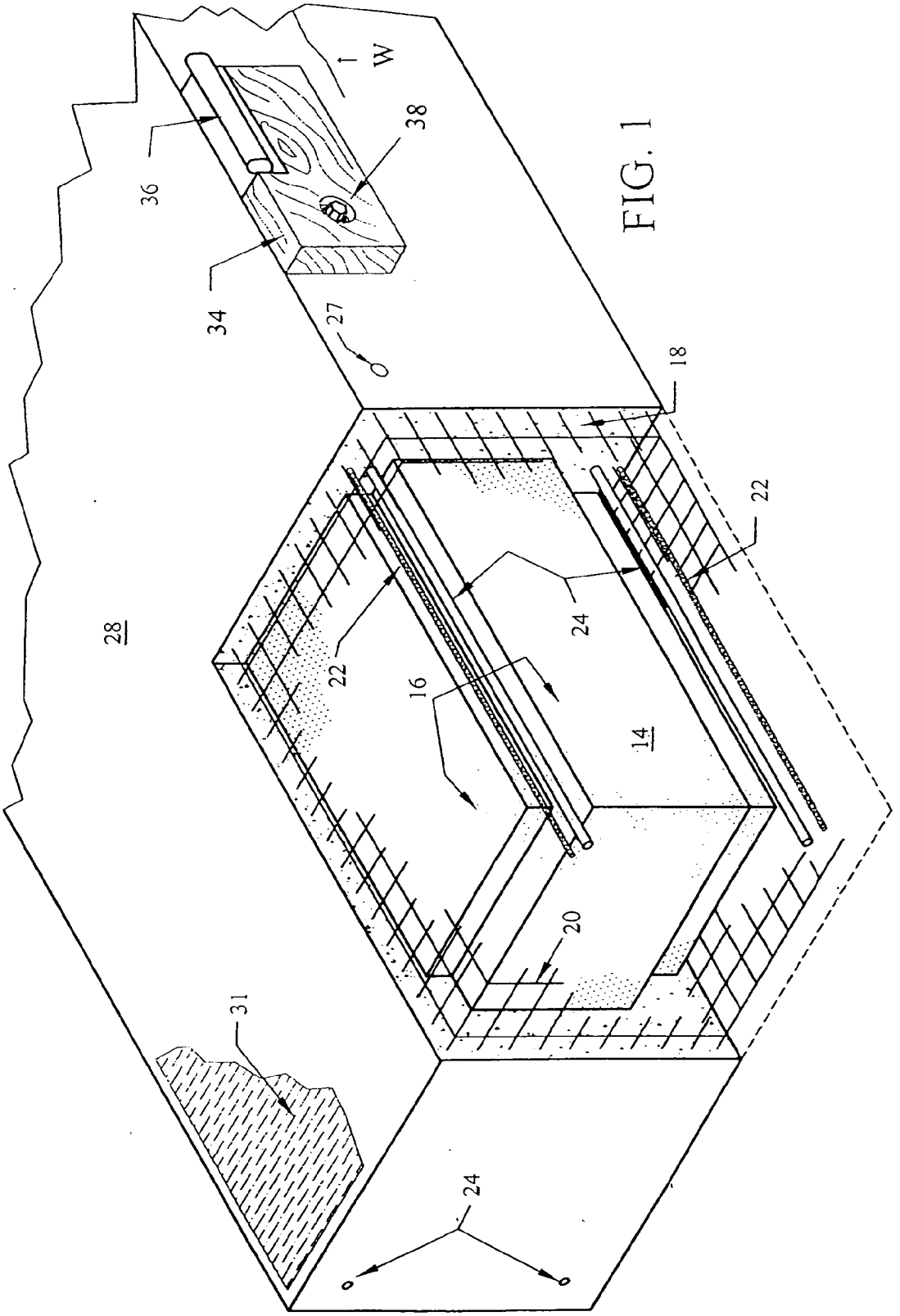


FIG. 1

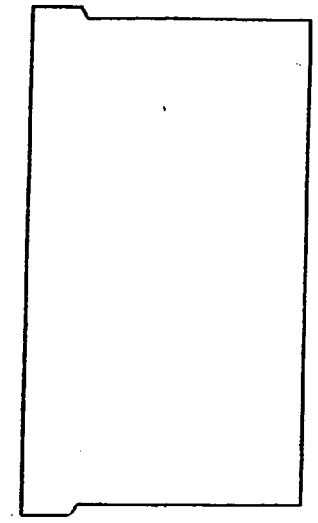


FIG. 2B

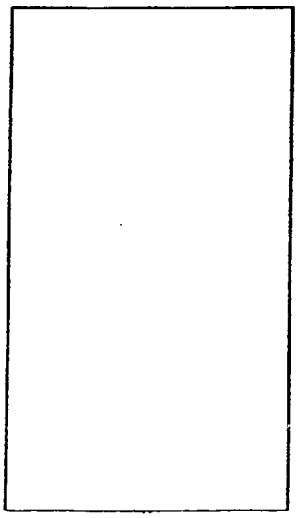


FIG. 2A

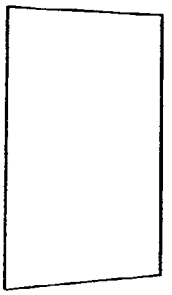


FIG. 2F

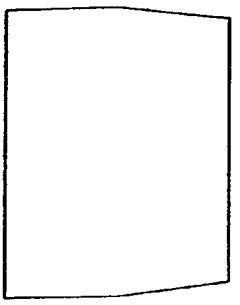


FIG. 2E

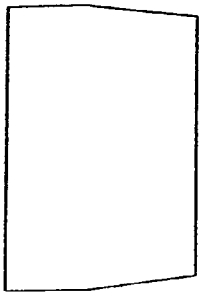


FIG. 2D

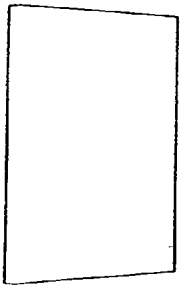


FIG. 2C

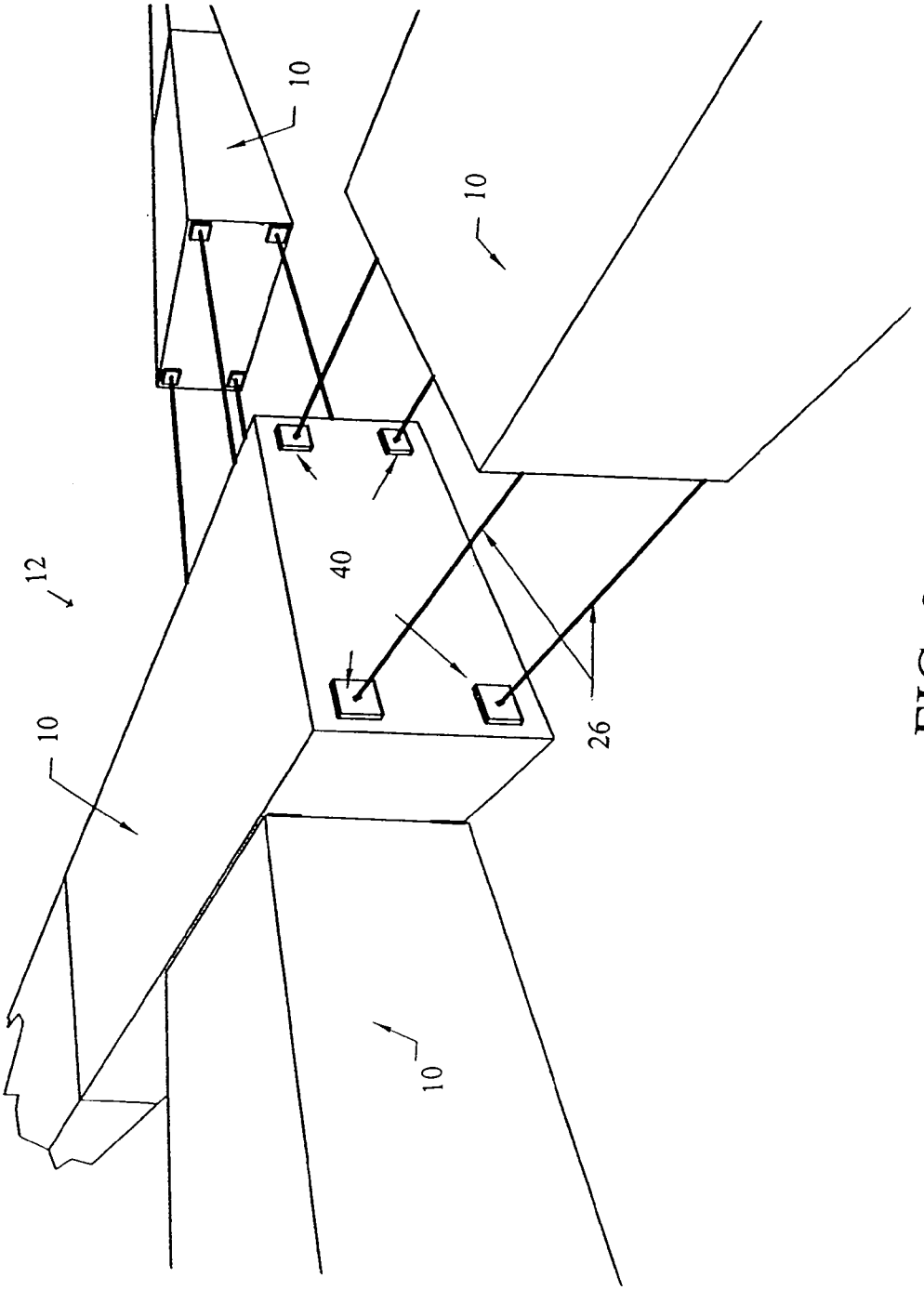


FIG. 3

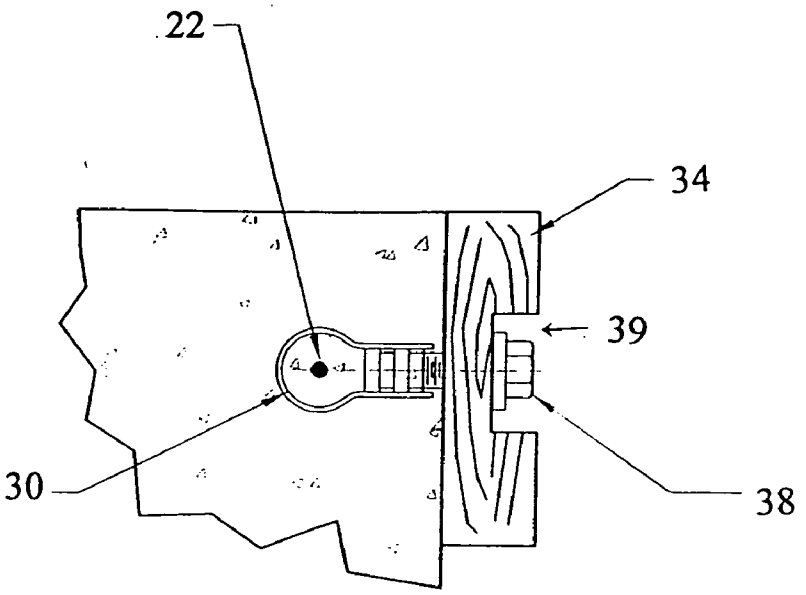


FIG. 4A

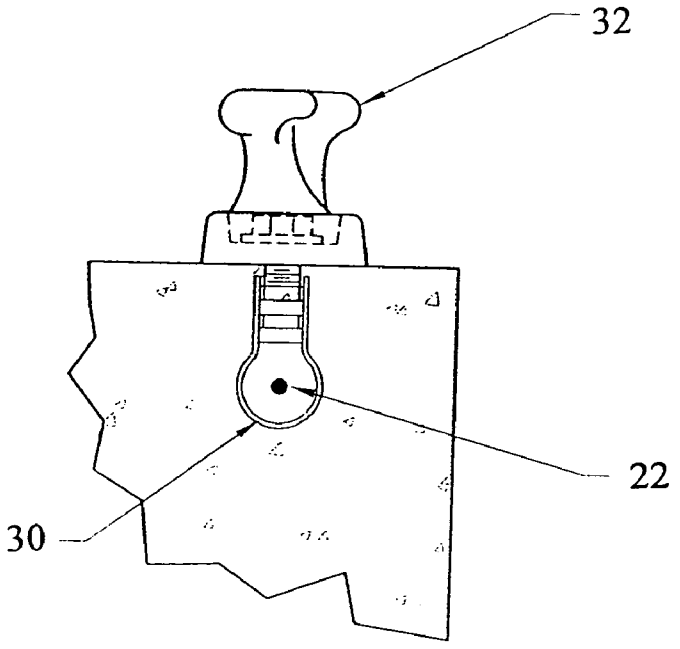


FIG. 4B

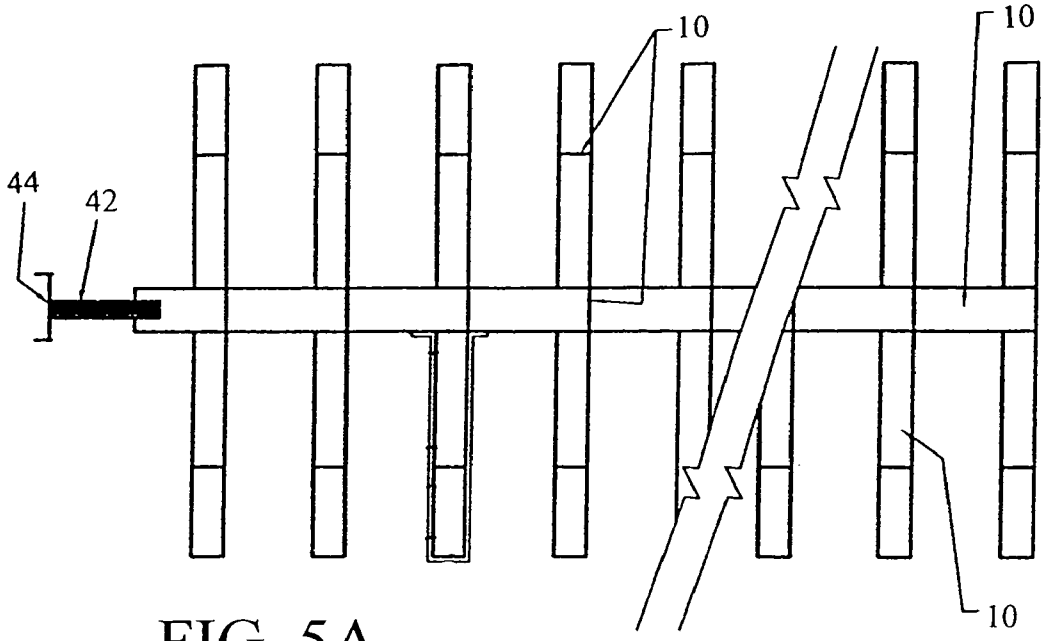


FIG. 5A

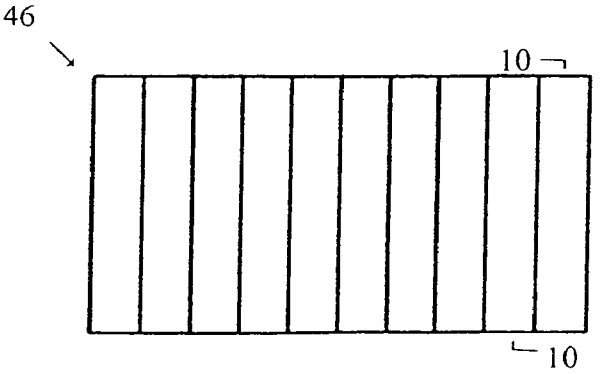


FIG. 5B

CORROSION RESISTANT PRESTRESSED CONCRETE FLOAT SYSTEM

FIELD OF THE INVENTION

[0001] This invention relates generally to prestressed concrete flotation structures. More particularly, this invention relates to floating prestressed concrete structures which are more corrosion resistant than conventional floating concrete structures.

BACKGROUND AND SUMMARY OF THE INVENTION

[0002] Prestressed concrete floatation structures are well known for use as docks, wharves, and the like. Such structures, such as described in U.S. Pat. No. 3,799,093 entitled FLOATING PRESTRESSED CONCRETE WHARF, include a buoyant material, such as expanded polystyrene, a layer of concrete surrounding the buoyant material, reinforcing wire mesh surrounding the buoyant material and located within the concrete layer, and pretensioned steel cables extending through the concrete to maintain it in compression. It has been observed that over time, particularly when the dock or other float structures are used in a saltwater environment, that the cables and wire reinforcing mesh may corrode and weaken the strength of the dock.

[0003] With regard to the foregoing, the present invention is directed to corrosion resistant prestressed concrete float units.

[0004] In a preferred embodiment, the units include a buoyant core encased within a polymeric coating, concrete encasing the core and polymeric coating, a corrosion resistant mesh to reinforce the concrete, and a plurality of corrosion resistant pretensioned fiber members extending the entire length of the unit.

[0005] In another aspect, the invention relates to a dock system made by interconnecting a plurality of the float units. The units preferably include chaseways for receiving post tensioning members for interconnecting a plurality of the units to provide the dock system.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Further features of preferred embodiments of the invention will become apparent by reference to the detailed description of preferred embodiments when considered in conjunction with the figures, which are not to scale, wherein like reference numbers, indicate like elements through the several views, and wherein,

[0007] **FIG. 1** is a perspective view of a float system according to a preferred embodiment of the invention, partially cut away to show interior portions thereof.

[0008] **FIGS. 2A-2F** show preferred cross-sectional geometries of float systems according to the invention.

[0009] **FIG. 3** shows a plurality of the float systems of **FIG. 1** arranged to provide a dock system according to a preferred embodiment of the invention.

[0010] **FIGS. 4A-4B** show preferred inclusion of mooring members and the like on the float system.

[0011] **FIGS. 5A-5B** show two examples of dock structures according to the invention.

DETAILED DESCRIPTION

[0012] With reference to the drawings, the invention relates to a corrosion resistant prestress concrete float system featuring one or more floating units **10**. Each unit **10** preferably has a cross-section configuration as depicted in **FIGS. 2A-2F**, but may also be configured to have other cross-sections. A plurality of the units **10** may be arranged as seen in **FIG. 3** and **FIGS. 5A-5B** to provide a floating dock or wharf system **12**.

[0013] Returning to **FIG. 1**, each unit **10** is constructed so as to be relatively corrosion resistant when used in a marine environment. This is accomplished in a preferred embodiment by avoiding the use of components such as steel in the construction of the units **10**.

[0014] In a preferred embodiment, each unit **10** preferably includes a buoyant core **14** encased within a polymeric coating **16**, concrete **18** encasing the core **14** and polymeric coating **16**, a corrosion resistant mesh **20** to reinforce the concrete **18**, and a plurality of corrosion resistant pretensioned fiber members **22** extending the entire length of the unit **10**. The unit **10** also preferably includes a plurality of chaseways **24** for receiving post tensioning members **26** for interconnecting a plurality of the units **10** in a desired manner. The unit **10** floats in water, with the line W in **FIG. 1** generally indicating the water level relative to the unit **10** during use.

[0015] The core **14** is preferably provided by expanded polystyrene foam or polyurethane foam. The polymeric coating **16** which encases the core **14** is preferably a polyethylene coating. The coating **16** is preferably roughened to facilitate bonding to the concrete **18**, and may be abraded or have appendages, corrugations or the like. The coating **16** inhibits moisture from contacting the core **14** to avoid the core **14** from becoming waterlogged and otherwise deteriorating from exposure to moisture, chemicals, and other substances which tend to deteriorate the core **14**. If desired, a vent may be provided between the core **14** and the atmosphere to enable venting of gases that develop. This may be accomplished as by a polymeric tube **27** or the like located to pass from the core and through the coating **16** and concrete **18** to a surface of the concrete, such as a side near the top. The exposed end of the tube is preferably configured to inhibit passage of moisture or other matter back to the core.

[0016] The concrete **18** is preferably a lightweight, regular weight, or polymer modified concrete material applied so as to surround the core **14**. The corrosion resistant mesh **20** provides reinforcement to strengthen the concrete **18** against loading, environmental changes such as temperature changes, and the like. The mesh **20** is preferably made of carbon fiber, polymeric materials such as polyethylene, glass reinforced plastic, or like materials which are substantially resistant to corrosion in a marine environment and resistant to corrosion in an alkali-concrete environment.

[0017] The corrosion resistant pretensioned fiber members **22** are preferably made of materials which are substantially resistant to corrosion in a marine environment and resistant to corrosion in an alkali-concrete environment, such as

carbon fiber strands, kevlar/aramid fiber strands, plain or vinyl ester coated glass fiber strands, polymeric fiber strands, and the like.

[0018] The chaseways **24** are preferably of extruded polyvinyl construction to provide chaseways that resist corrosion/deterioration in a marine/alkali-concrete environment. The chaseways **24** may preferably be provided as by pvc piping. The chaseways **24** receive the post tensioning members **26**, which are preferably formed of similarly non-corrosive materials, most preferably carbon fibers or aramid fibers. The units **10** may preferably be strung on the members **26** to provide a dock or other floating structure.

[0019] The units **10** are made using a suitable mold and tensioning devices for pouring of the concrete. After the concrete is cured, the fiber members **22** are preferably trimmed to be flush with the exterior of the concrete **18** or the post tensioning member **26** or restraints therefor. An upper or deck surface **28** of the concrete **18** may be brushed during curing to provide a non-slip surface **31**.

[0020] With reference to **FIGS. 4A-4B**, the concrete may be configured to receive threaded inserts **30** for attachment of mooring cleats **32**, with the insert **30** preferably being configured, as by including an aperture, for passage of the pretensioned fiber members **22** or other reinforcement. Likewise, rail member **34**, such as a board, preferably having a rubber bumper rail **36** adhered thereto, may be attached as by bolt **38** which cooperates with the insert **30**. The rail member **34** preferably includes an insert portion **39** so that the bolt **38** does not protrude. Also, elastomeric pads **40** are preferably adhered or otherwise secured to the exteriors of the units **10** for padding between adjacent units.

[0021] With reference to **FIG. 5A**, a plurality of the units **10** are interconnected and extend from a boarding ramp **42** which extends from a bulkhead **44**. In **FIG. 5B**, a floating platform **46** is provided by a plurality of the units **10** arranged side-by-side. In this regard, it is noted that the units **10** may be of a variety of sizes and configurations and may be utilized with other units **10** or other structures to provide a wide variety of floating configurations.

[0022] The foregoing description of certain exemplary embodiments of the present invention has been provided for purposes of illustration only, and it is understood that numerous modifications or alterations may be made in and to the illustrated embodiments without departing from the spirit and scope of the invention as defined in the following claims.

1. A corrosion resistant prestressed float system, comprising one or more float units, each including a buoyant core encased within a polymeric coating, concrete encasing the core and polymeric coating, a corrosion resistant mesh to reinforce the concrete, and a plurality of corrosion resistant pretensioned fiber members extending the entire length of the unit.

2. The float system of claim 1, further comprising a plurality of chaseways for receiving post tensioning members for interconnecting a plurality of the units in a desired manner.

3. The float system of claim 1, further comprising a vent extending from the core to an exterior surface of the concrete and in communication with the atmosphere for venting gases from the core to the atmosphere.

4. A corrosion resistant prestressed float unit comprising a buoyant core encased within a polymeric coating, concrete encasing the core and polymeric coating, a corrosion resistant mesh to reinforce the concrete, and a plurality of corrosion resistant pretensioned fiber members extending the entire length of the unit.

5. The float unit of claim 4, further comprising a vent extending from the core to an exterior surface of the concrete and in communication with the atmosphere for venting gases from the core to the atmosphere.

6. A floating dock system comprising a plurality of corrosion resistant prestressed float units, wherein the float units each comprise a buoyant core encased within a polymeric coating, concrete encasing the core and polymeric coating, a corrosion resistant mesh to reinforce the concrete, and a plurality of corrosion resistant pretensioned fiber members extending the entire length of the unit.

7. The dock system of claim 6, further comprising a plurality of chaseways defined within each of the units and a plurality post tensioning members received within the chaseways for interconnecting a plurality of the units in a desired manner to provide the dock system claim **8**. The dock system of claim 6, wherein one or more of the units includes a vent extending from the core to an exterior surface of the concrete and in communication with the atmosphere for venting gases from the core to the atmosphere.

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