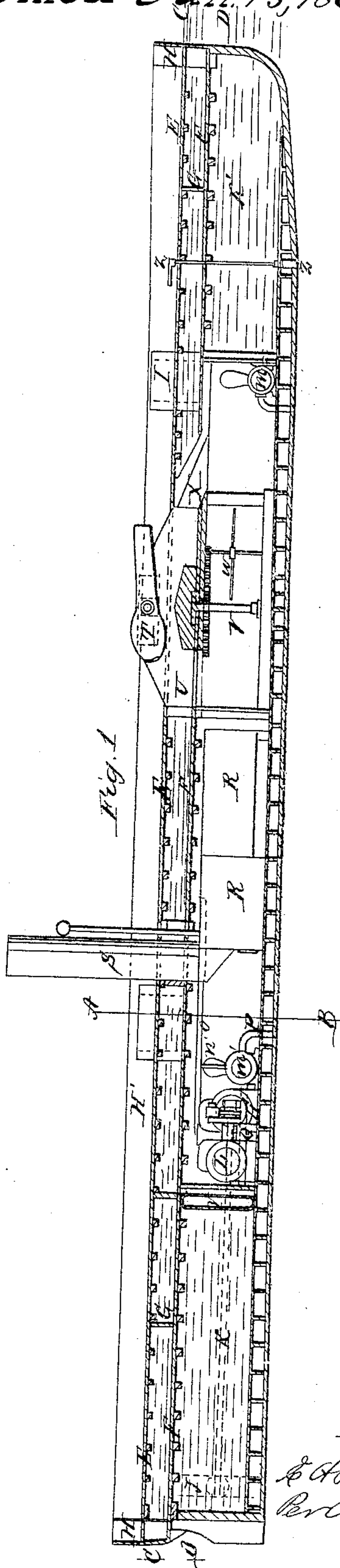
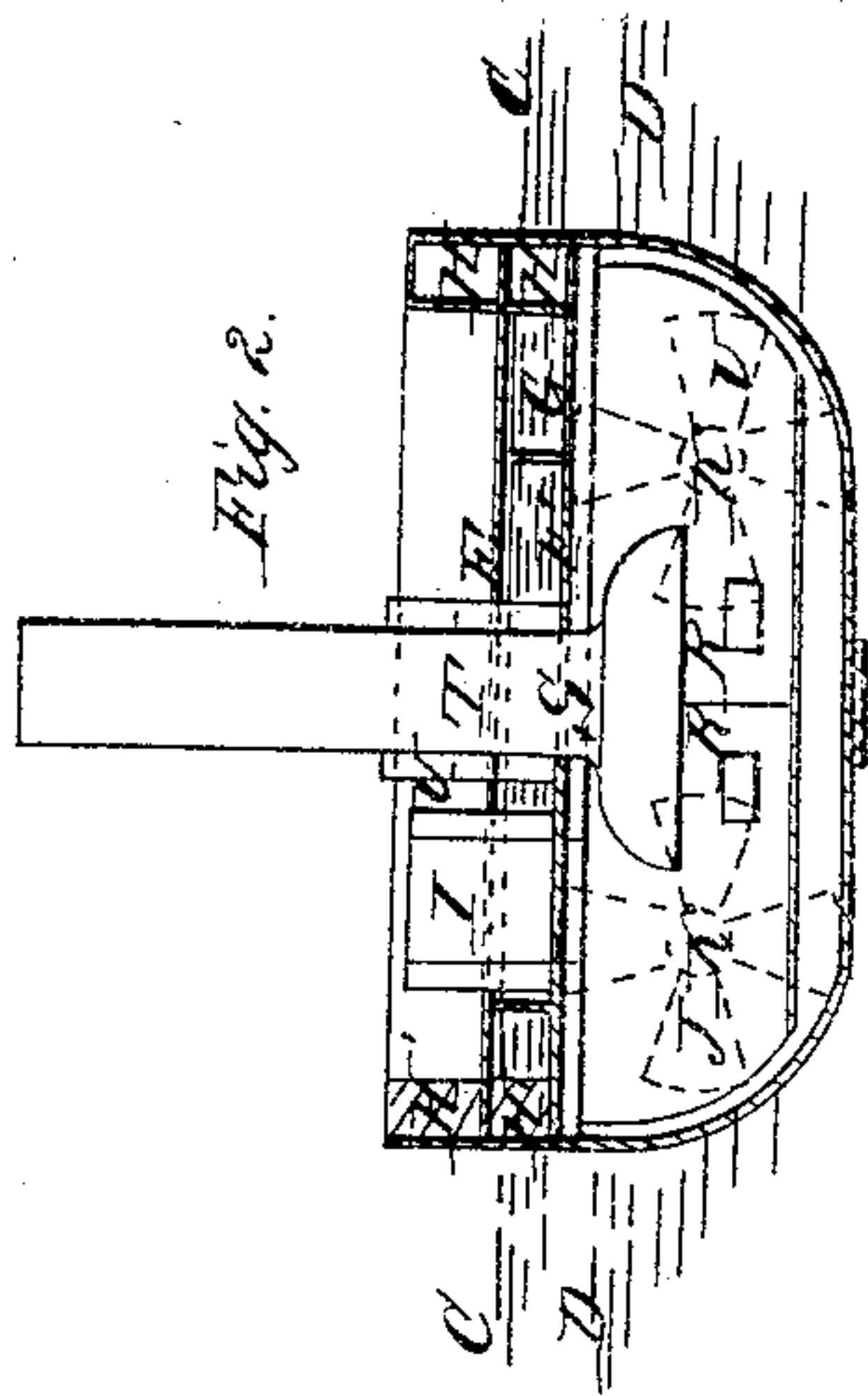


*E. A. Stevens.*  
*Armor Clad.*

*N<sup>o</sup> 37. 411.*

*Patented Jan. 13, 1863.*



*Witnesses.*

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# UNITED STATES PATENT OFFICE.

EDWIN A. STEVENS, OF HOBOKEN, NEW JERSEY.

## IMPROVED CONSTRUCTION AND DEFENSE OF WAR-VESSELS.

Specification forming part of Letters Patent No. **37,411**, dated January 13, 1863.

*To all whom it may concern:*

Be it known that I, EDWIN A. STEVENS, of Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Constructing Vessels of War; and I hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a longitudinal vertical section of a vessel embodying my improvements. Fig. 2 is a vertical cross-section of the same at the line A B, Fig. 1.

The first part of my invention consists in protecting what I call the "vital parts" of war-vessels from shot and shell by lowering the vessel in the water, so that a water-protected deck shall be lower than the external water. For instance, the submerged portion of the hull, excepting the sides, bulk-heads, and parts which connect it to the upper portion of the vessel, and the openings for communication between the upper and lower parts, may be completely enveloped with water by placing a stratum of water on a deck situated below the water-line. Being thus surrounded, this part of the vessel will be protected from shot and shell by virtue of the non-elasticity of water—a quality which causes cannon-shot fired at it at an acute angle to ricochet instead of entering, and which takes away the dangerous velocity of shot fired at any angle.

What I mean by vital parts of a vessel are, first, space enough inside of a vessel to secure her flotation; second, the parts where the engines and boilers are situated, and where, according to my plan, the men and machinery to work the guns are situated. If these are protected, the upper parts necessary to make the vessel convenient in other respect, may be injured or partially destroyed in action without disabling the vessel in her locomotive or fighting qualities.

The parts of an ordinary vessel below the water-line, excepting the streak very near the water-line, are already well protected against shot by the water in which the vessel floats; but the parts above the water-line not being so protected, modern warfare has led to the use of heavy iron casemates constituting the upper portions of the vessel, in order to prevent

their destruction by shot and shell. My invention is a means of protecting the aforesaid vital parts without the use of such casemates, and for this purpose I place a stratum of water thick enough to constitute a sufficient protection against projectiles over such vital parts as I intend to protect, and either at or below the water-line. The water may be held in various ways. It may be simply run upon a deck or between two decks, or into separate tanks, or it may be placed in boxes, bags, cells, or other vessels laid upon a deck. What I prefer is a heavy water-tight iron deck divided into compartments by both cross and longitudinal bulk-heads, so that the breaking open of one would not remove the water from the remainder, the water to be about two feet deep, and the whole to be covered with a light deck to prevent the water from washing over the sides of the bulk-heads, and to make a place for the crew to stand and operate when necessary. The compartments would be connected together, and one of them connected to a steam-pump, which could both empty and fill the hole, or each compartment might be separately connected to the pump. Hatches through the deck would be placed in proper positions to ventilate the vessel and to give places of entrance to the interior. These hatches, as well as the chimney of the boiler and all necessary entrances, would be provided with shot-proof combings of sufficient height to keep both shot and water from entering the vital parts of the vessel.

To prevent the bursting or injury of any of the water tanks, vessels, or compartments referred to in this specification by the entrance of projectiles, I propose to place air-vessels, made of gum or very thin metal or bladders, in these tanks or vessels, either attached to the sides or any part of them or fastened to the bottom or sides by strings or wire, so as to retain their position, or left to float when the tanks or vessels are filled; or the sides or top or bottom or all parts of the tanks or vessels may be lined with some elastic material in such manner as to leave an air-space between said lining and said sides, top, or bottom. The purpose is, water being non-elastic, to prevent the bursting or injury of the water tanks or vessels by introducing within them air-vessels which will compress on the en-



trance of the projectile, and thus make room for the ball; or I place, when preferred, as a substitute for this stratum of water, a horizontal bulk-head or deck composed of or covered with metallic armor. Although this armor, unlike the sides of the casemate before referred to, may be comparatively thin, as it has only to glance horizontal or inclined shot and to resist shells, yet I prefer a stratum of water, chiefly because, however great the amount of water required to make an adequate protection, it may all be thrown overboard when the vessel is not in action, thus reducing weight and increasing speed with a given power. In some cases I employ both the stratum of water and the metallic armor as an additional protection. For convenience, I call this horizontal protection in either of the ways above described a "protected deck." This protected deck should be below the water-line when the vessel is in action, in order to complete the inclosure of the vital parts of the vessel; but when out of action it is better to have it above the water-line, and the water protection removed for the sake of lightness, height out of water, and various obvious reasons. Therefore, I place the protected deck above the sailing water-line of the vessel, and having settled the vessel upon going into action so as to bring the protected deck below the fighting water-line, I raise it again when going out of action, by which means the uninjured deck and sides that were protected when in action are raised above water far enough to adapt the vessel to sailing and other uses. I settle the vessel to the fighting-draft by letting water through holes regulated by valves, or by pumping water from the outside of the vessel into compartments or tanks arranged for that purpose in the vessel or on any of her decks, or in all these places. The before-mentioned stratum of water used for protection may also be employed for this purpose. I raise the vessel again to her sailing-draft by pumping out the water in these compartments, tanks, or vessels. I prefer steam-pumps for this purpose. The compartments should be so placed that by letting more or less water into either of them the vessel can be put on an even keel longitudinally or athwartship or by the head or by the stern, as may be required.

I am aware that vessels have been settled in the water before for the purpose of trimming them and for the purpose of rendering them less visible to an enemy at a distance; but I am not aware that any vessel has ever been settled in the water for the purpose of protecting it against shot, or that it has ever been settled in the water, either up to or below a deck protected by water or otherwise against shot, or that prior to my invention any vessel ever had a deck protected by water or iron against shot, in combination with sides protected by water against shot to a line above such deck, or that any plan or means has ever

been suggested or known by which such can be done.

To give the vessel a greater degree of stability and buoyancy than it would have when settled, as described, into the water, and when greatly damaged above the protected deck, I secure to the upper portion of the vessel what I call a "buoyant structure," in such manner that the upper part of this structure may project out of water when the vessel is settled into the water. I prefer to place this buoyant structure in the position either of an ordinary guard or an ordinary bulwark. This buoyant structure may be made either of solid timber or of air cells or chambers of metal, rubber, or other material. If made of white cedar or similar wood not subject to splinter, or of cork, this buoyant structure might be riddled with shot without losing any more of its buoyancy than that due to the small loss of material occasioned by the passage of the ball. If made of air-cells, it is probable that only a small portion of them would be pierced in action, while the buoyancy of the rest would not be affected.

In addition to the advantage of certainly protecting the vessel against shot and shells by water, in the manner described, this construction enables me to place the cannon above the upper deck—a situation in which they would possess the hereinafter-mentioned advantages over cannon placed within the sides of a vessel. Armor of sufficient thickness to certainly resist the heaviest projectiles, and of sufficient extent to cover the guns and the gunners, is necessarily of extreme weight, thus rendering its use impracticable for small vessels of light draft. The height and extent of such armor would also form a much larger mark for the enemy than the projecting guns of my arrangement. Such armor would also require to be pierced with numerous and large port-holes, which would not only weaken it, but would give the enemy at the start this number of openings to throw in grape, shells, and rifle-shot. Cannon thus placed within the sides of a vessel would have but a limited range, that on the starboard side, for instance, being useless in fighting the port side of the vessel, as each tier of guns could only fire on its own side, instead of round the circle, thus requiring double the number of guns of a given caliber to throw the same weight of projectiles that would be required in a vessel upon which all the guns could fire in any direction. I propose to place the cannon at the usual distance, with reference to the purpose for which they are used, above the upper deck, on pivots or turn-tables, so as to be pointed, with certain limitations, hereinafter described, all round the circle, and be brought to bear at the same time on any object in any direction.

The pivots or other machinery for turning the guns may be operated in various ways below deck and below the level of the water, so that the men and the machinery employed in



operating them will be protected; or they can be worked above deck, if deemed expedient. The guns may also be loaded, aimed, and fired by men and machinery situated below the deck, and thus protected from the fire of the enemy. It is probable that guns of fifty thousand pounds weight (which is about the weight of fifteen-inch guns) would not be readily broken by cannon shot without protection; but, in addition to this, the guns would be covered with wrought-iron bands, which would serve the double purpose of strengthening them and protecting them from injury by the enemy's shot. By means of placing an elastic resisting substance, either behind and before the trunnions of the gun or between the carriage and the pintle by which it is turned, or between the parts that recoil and some fixed part of the vessel, the exposed supports or carriages of the guns may be composed of masses of iron too strong and heavy to be broken by shot, and so shaped that projectiles will glance off from them without doing any serious injury. The guns could all be fired nearly parallel to the keel, as they would only need to clear each other, there being nothing else in the way. In this case their recoil would, therefore, not tend to careen the vessel and keep her rolling, as in case of broadside-firing; but the guns would be nearly as stable, and therefore could be aimed with nearly as much precision as if they were on shore. In case of the bursting of a gun, its position above deck and above the gunners would expose no one to harm, and avoid the confusion incident to an explosion. The position of the gun above deck would also prevent the dangerous effects upon the hearing of the gunners that large guns fired below or between decks would be likely to produce. It would also prevent the suffocating effect of sulphurous smoke below deck, and thus enable more rapid firing and more expeditious, cool, and effective operation than would be possible with guns fired within a closed shot-proof covering or tower. As no one is necessarily on deck, the smoke from the boiler-furnaces, passing close to the deck, would not interfere with working the ship or guns, so that the part of the chimney above the level of the guns could be dispensed with, the draft being maintained by using the exhaust-steam in the part of the chimney below the level of the guns, or by blowers arranged according to my patent of April 1, 1842, which prevents the escape of deleterious gases into the fire-room. This would give an opportunity for all the guns to bear on any object in almost any direction. I propose to arrange the guns so that when deemed expedient the gunners can set any or all of the guns to stand at the angle indicated by a graduated index-plate. The man at the wheel can then cause the guns to bear upon any object by changing the course of the vessel by the helm, when under headway, and in case of a double propelling-

power—such as two screws—by changing her position without making headway.

The methods hereinbefore referred to for protecting, working, loading, and stopping the recoil of guns, and setting or pointing them by graduated index-plates, I have made the subjects of separate applications for Letters Patent.

In order that my invention may be more fully understood, I will proceed to describe the same with reference to the accompanying drawings.

K and K' are chambers or tanks into which water is introduced in order to lower the vessel in the water.

M and M' are steam-pumps employed to fill or empty the chambers K and K' when it is desired thus to lower the vessel or again raise her to her sailing-draft. If preferred, the water may be allowed to flow in by valves, as at Z, or a similar means may be employed to permit the water to flow out if any chamber is above the water-line.

J J are screw-propellers driven by the shafts *k k* and the engines L L'.

R is a boiler for supplying steam to the engines L and L' and to the steam-pumps M and M'.

F represents what I call the "protected deck," of sufficient strength to sustain in the space above it the body of water placed upon it, which will constitute a resisting medium to protect the interior of the ship from shot and shell. The said water-space is divided into a number of compartments by means of partitions G, which may run in any direction, for the purpose hereinbefore explained.

Y is an air-vessel occupying a part of a water-compartment to preserve the sides or bulk-heads from injurious concussions by the displacement of the water in the event of a shot entering the water-space; or F may represent a deck protected, as hereinbefore explained, by metallic armor and either covered or not covered by water.

E is a deck placed over the water situated on the protected deck F.

H is a cellular metallic structure surrounding the upper part of the hull. The purpose of this structure is to impart stability and buoyancy to the vessel when submerged for action. Instead of being made cellular, it may, if preferred, be constructed of buoyant material, as at H', as has been hereinbefore more fully set forth.

T is a gun mounted on a carriage, U, which may be revolved by the pintle V by men or machinery below the water-line, and which may be loaded through the hole X from below the water-line.

I I are hatches for ventilation and for ingress and egress.

S is the smoke-funnel.

C C may be the fighting water-line, and D D the sailing-line.

Other parts of the vessel not herein referred



to may be of any suitable construction, and do not require a specific description.

Having described a way in which the invention may be carried into effect, what I claim therein as new, and desire to secure by Letters Patent, is—

1. Lowering a war-vessel in the water so that a water-protected deck shall be lower than the surface of the water outside, substantially in the manner and for the purpose described.

2. The buoyant structure, substantially as described, applied to a partially or wholly submerged war-vessel, to impart stability and buoyancy thereto.

3. The buoyant structure referred to in the foregoing claim, in combination with a protected deck situated or placed below the water-line of a war-vessel, substantially as described.

4. An air-vessel constructed in any suitable manner, and combined with any of the water compartments or vessels specified, substantially as and for the objects described.

E. A. STEVENS.

Witnesses:

OCTAVIUS KNIGHT,  
JAMES H. GRIDLEY.