

(No Model.)

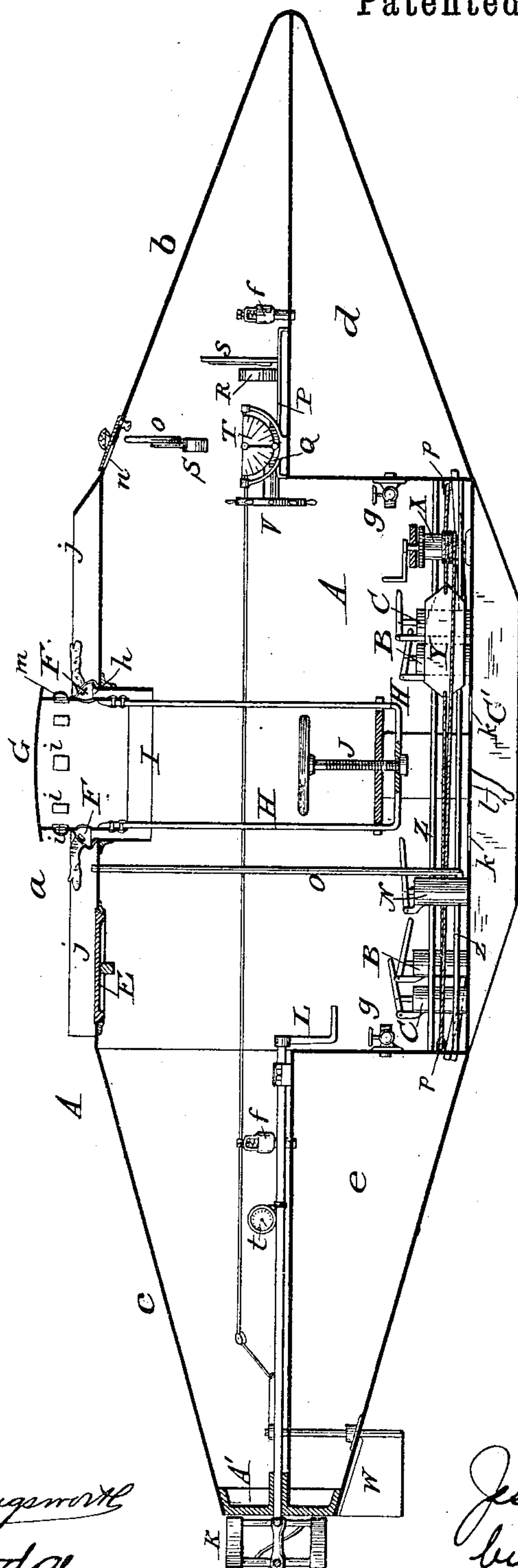
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J. JOPLING.
SUBMARINE BOAT.

No. 273,851.

Patented Mar. 13, 1883.

Fig. 1.



Attest.
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2 Sheets—Sheet 2.

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Fig. 2.

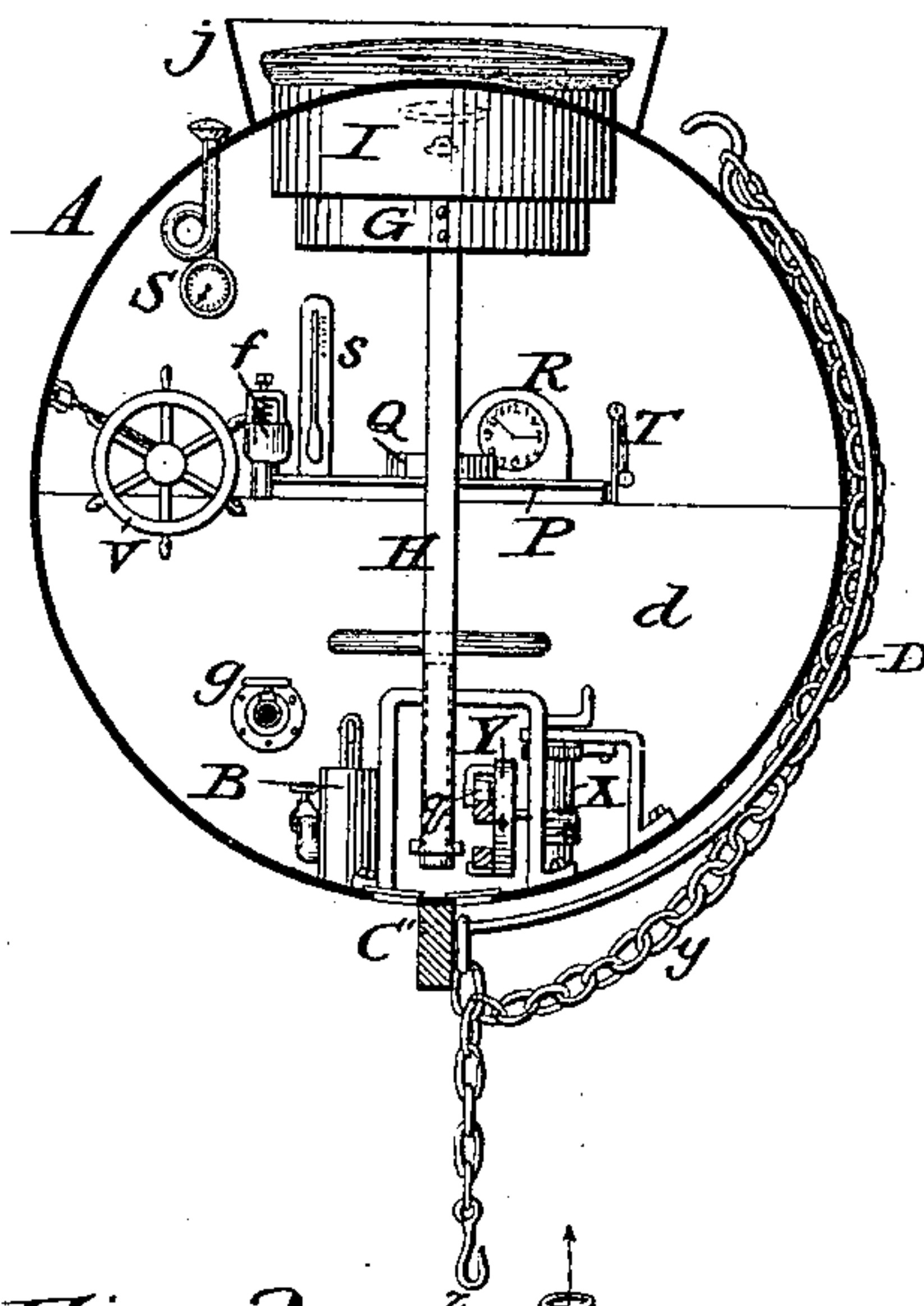


Fig. 3.

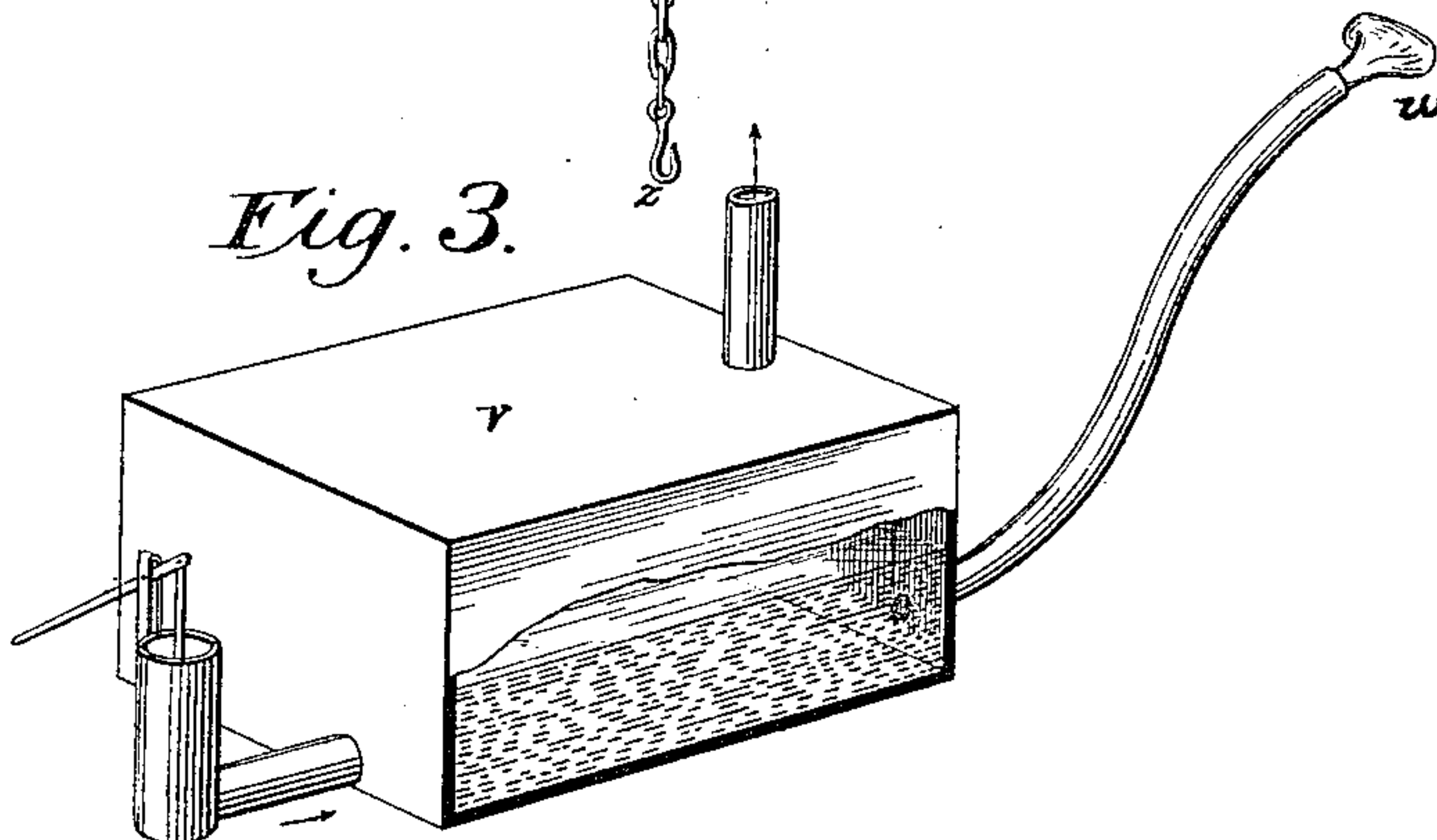
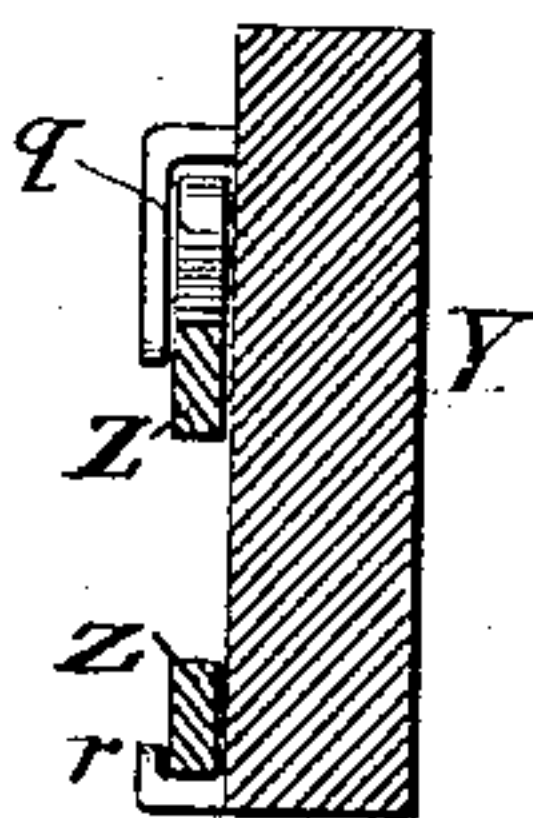


Fig. 4.



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UNITED STATES PATENT OFFICE.

JESSE JOPLING, OF LONGWOOD, MISSOURI.

SUBMARINE BOAT.

SPECIFICATION forming part of Letters Patent No. 273,851, dated March 13, 1883.

Application filed May 6, 1882. (No model.)

To all whom it may concern:

Be it known that I, JESSE JOPLING, of Longwood, in the county of Pettis and State of Missouri, have invented certain Improvements in Submarine Boats, of which the following is a specification.

My invention relates to submarine navigation, and especially to improvements upon the boat for which Letters Patent were granted me, bearing date February 1, 1876, and numbered 173,018, to which reference is hereby made.

In the accompanying drawings, Figure 1 represents a longitudinal vertical section of my improved boat; Fig. 2, a vertical transverse section of the same, and Figs. 3 and 4 views illustrating certain details hereinafter explained.

A leading feature of my plan consists in waterlogging the boat, or causing it to be in a state of equilibrium, so that it shall move with equal facility upward, downward, or horizontally under water, according to the direction in which its bow is pointed, without requiring the propeller-wheel to be thrown from its ordinary working position, and without the aid of special wheels for effecting the ascent or descent of the boat.

To render the boat perfectly manageable, to ascertain and determine at all times its depth, direction, and inclination longitudinally or laterally, to purify the air and render it fit to be breathed over and over, to permit the crew to operate outside of the boat, to facilitate the raising of heavy articles to the surface, and to accomplish various other desirable results, I provide special means and appliances, which will be fully set out in the following description.

Referring now to the drawings, A represents the hull or body of the boat, constructed of circular form in cross-section, with pointed or tapering ends, as shown, to cause the boat to move through the water with the least practicable resistance. The hull will be constructed of boiler-plate iron or steel, the thickness of which will depend largely upon the size of the boat, the maximum depth to which it is intended to descend, and like considerations.

A convenient size for the boat will be about twenty-six feet in length by six and one-half

feet in diameter, though of course I do not limit myself to any particular size or proportions.

For convenience of description, I will assume the above proportions, and describe the preferred construction and proportion of other points upon that basis.

The middle section, *a*, will then be about ten feet in length and of cylindrical form, while the front and rear sections, *b* and *c*, will each be about eight feet in length, and tapering from six and one-half feet, where they join the middle section, to a rounded point for the forward end, and a circular end of about two feet or less diameter at the rear, as indicated.

The lower half of both the front and rear section is divided off, as shown, forming water-chambers *d* and *e*, into which water is introduced to effect the waterlogging of the boat, and from which water is expelled when it is desired to have the boat rise above the surface of the water in which it moves, or to give buoyancy or lifting-power to the boat to raise heavy substances from the bed or bottom.

Various different plans have been proposed for causing the ascent and descent of submarine boats, and among other contrivances wheels have been provided. The water has been expelled from or taken into the water-chambers for this purpose; or detachable ballast has been carried, to be detached or let down when it is desired to ascend, and drawn up when it is desired to move about.

Under my plan, the water-log or equilibrium of the boat, being once established, is maintained constantly, so long as the boat remains below the surface, all changes of direction being effected by shifting ballast, which serves to depress either end of the boat and elevate the other end, and by the rudder.

The boat is designed to carry on its top torpedoes of considerable weight, which, being detached or removed from time to time, will destroy the water-log of the boat, which must be quickly restored by pumping or forcing water into the chambers *d* and *e*, the depth-gage serving to show when the water-log is restored by its indicator coming to a standstill. The reason of this will be readily understood, since the rising or falling of the boat causes the indicator to move, because of the

increase or decrease of the pressure, and of course when the movement of the indicator ceases it will be apparent that the boat neither rises nor falls, but is exactly balanced or in equilibrium.

In order that there may be ample space for the additional quantity of water required to thus compensate for the decrease of weight due to the removal or detachment of a torpedo or other matter, the chambers *d* and *e* should be only partially filled when the boat is first submerged, bags of sand or other convenient ballast being carried into the boat to overcome its natural buoyancy, and so placed that with the weight of the crew, when the men are in their respective positions, the ballast and the keel, hereinafter referred to, shall serve to keep the boat normally in a true horizontal position, or in "trim," all depression or elevation of the bow or stern being effected by a shifting weight or ballast, as presently explained.

The water-chambers *d* and *e* are each provided with a valve, *f*, opening into the interior of the boat, or into a special chamber, if preferred, to receive the air expelled from the water-chambers when water is let into them; or the valves may open communication between the water-chambers and the outside of the boat, the necessary air for again displacing the water being taken from a special chamber containing compressed air, or from a supply of compressed air with which it is designed to furnish the interior of the boat. Water may be admitted to the chambers *d* and *e* through valves *g*, opening through the wall or sheathing of the boat, or may be forced in by pumps *B*, as indicated. Suitable pumps, *C*, are also provided for expelling the water therefrom. The boat is further provided with a heavy metal plate or keel-bar, *C'*, at its lower side, running from end to end of the middle section, *a*, and serving to keep the boat in a proper upright position to assist in giving the necessary weight to overcome the buoyancy of the boat, and as a means for securing one end of the curved metal bar or rod *D*, the purpose of which will be presently explained. The ends of the keel *C'* are beveled or rounded to enable it to ride freely over any objects with which it may come into contact.

At the top of the boat there is provided a hatchway, which is closed and sealed water and air tight by a cap-plate or cover, *E*, preferably formed with a beveled flange and packed by a rubber or other elastic gasket, as indicated, and held in place by an eccentric locking-bar or other well-known fastening devices. A second opening is formed in the top just in advance of the first, and surrounded by an annular grooved flange, *h*, to which is firmly secured the lower end of a water-proof flexible jacket or trunk, *F*, the upper end of which is similarly secured to a vertically-moving cylinder, *G*, of metal, having a closed top, and provided with glazed openings *i* in its sides. The cylinder is carried by a vertically-moving yoke,

H, sliding through a guiding casing or cylinder, *I*, projecting downward from the top of the boat, and is raised and lowered by a screw, *J*, provided with a hand-wheel, as shown. The trunk or jacket is provided with sleeves and gloves, all made in one, or joined one to another in such manner as to prevent the entrance of water, and by preference two or more sets of sleeves are provided to enable a person inside the trunk to operate conveniently on all sides. When the yoke and cylinder or cap *G* are lowered the trunk or jacket is drawn down between cylinder *G* and casing *I*, only the sleeves being left out, and these may, if preferred, be drawn in also. The projecting flange or edge of cap *G*, extending over the flange *h*, then fully protects the trunk against injury.

On the top of the boat, and surrounding the openings therein, *I* form a guard or fender, *j*, the forward side of which is beveled or inclined backward to offer the less resistance to the water. This guard is designed to keep in place topedoes and other articles carried on the top of the boat.

One or more glazed openings, *k*, are formed in the bottom of the boat, and at any other desired points, to enable the crew to see objects below or at the sides of the boat, and a sleeve, *l*, of flexible water-proof material, is placed close to any or all of such openings, as may be desired. Shields or fenders *m* will be provided to protect the glass and the sleeves from injury when not in use.

The boat is propelled by a screw-propeller wheel, *K*, the shaft of which is furnished with a crank, *L*, to which the power is applied.

The rear end of the boat is provided with a cast-iron head or end plate, *A'*, in which is formed a suitable bearing or box for the shaft, and the inner or forward end is similarly carried.

For the purpose of supplying the boat with compressed air before descending, an air-pump, *N*, is provided, and a supply-pipe, *O*, is extended upward through the top of the boat and furnished with a valve, by which it may be opened or closed at will.

P represents the pilot's table, directly over which is an outlook or glazed opening, *n*, to permit the pilot to see what is ahead, and upon or about this table are grouped the various instruments necessary to the proper management of the boat.

The instruments and appliances will now be mentioned and explained.

Q represents a compass, which will be arranged in any of the approved ways now commonly adopted in iron ships to neutralize the disturbing effect of the metal.

R represents a chronometer, the purpose of which is of course understood.

S indicates a depth-gage, which may be of the same construction as an ordinary steam or pressure gage, the inlet-pipe *o*, which extends outside of the boat, being curved or coiled or provided with a perforated cap, as shown, to

prevent the movement of the boat through the water from causing it to register improperly.

T is a plumb suspended from the center of a graduated swinging semicircle. The plumb serves to indicate the elevation or depression of the ends of the boat relatively to one another, and the swinging sector prevents the movement of the plumb from being interfered with by the rocking of the boat. It may also serve to indicate a lateral inclination of the boat.

V represents a windlass by which the rudder W is controlled in the ordinary manner, and X represents a second windlass, by which a sliding weight, Y, is moved longitudinally within the boat upon a supporting beam or guide, Z, cords being attached to the two ends of the weight and carried about pulleys *p* to the windlass, as shown. The weight is placed close to the bottom of the boat, and is furnished with rollers *q*, to run upon the upper edge of the beam or guide Z, while lips or ears *r* engage over the lower edge and prevent the displacement of the weight.

A barometer, *s*, indicates the degree to which the air in the boat is compressed.

A register, *t*, connected with the propeller-shaft and operating in connection with the clock, may be made to indicate the distance traveled.

With these instrumentalities immediately at his command, the pilot is enabled to tell the course and speed of the boat, and thus to ascertain its precise location at any time.

In order to enable the crew to remain for a long time under water, I provide one or more vessels, *v*, containing lime-water or other chemicals capable of precipitating the carbonic acid exhaled in breathing, and I provide flexible tubes and nose or mouth pieces *w*, to connect with said vessel or vessels, through which to exhale the breath. In this way the carbonic acid is precipitated and the oxygen and nitrogen allowed to reunite to form pure and fit air to be breathed again.

If preferred, the air of the boat may be pumped through a closed chamber containing lime-water or like chemicals, and thus the mouth or nose pieces could be dispensed with.

To facilitate raising heavy articles to the surface, I provide a chain, *y*, the lower end of which is furnished with a hook or grapple, *z*, the chain being provided with a ring to slide upon the curved bar or rod D, to the upper end of which the upper end of the chain is loosely hooked, as shown. The weight or article to be raised is secured by the hook or grapple, and is caused to hang directly from the center and bottom of the boat; but when the boat reaches the surface the upper end of the chain, being made fast to any convenient hoisting apparatus, is drawn up and caused thereby to elevate the article or weight to the surface, where it can be properly disposed of.

By means of the depth-gage I am enabled to weigh the boat and to ascertain when it is in a state of equilibrium with the water in which it is submerged at any depth, and this, too, while within the boat, thus placing the boat entirely and perfectly under the control of the crew, and enabling them to tell at all times whether the boat is rising, falling, or moving in a horizontal plane, and also enabling them to add to or diminish the ballast to accord with the depth of the water.

The pendulous weight or indicator enables the navigator to tell precisely the line of movement, without which information it would be impossible to ascertain the distance traveled in a straight line between points, it serving the same purpose in noting the deviation from a horizontal line of movement that the compass serves in showing the direction relatively to the poles.

I am aware that it is not broadly new to pass the air of the boat through chemical solutions for the purpose of precipitating the carbonic acid, and therefore I do not claim this, broadly considered. I however believe it to be new to provide a vessel or tank for containing such solutions with flexible tubes and mouth-pieces, as herein shown and described.

Having thus described my invention, what I claim is—

1. In combination with the vertically-moving cylinder or cap G, the flexible trunk or jacket F, secured thereto and to the body of the boat, substantially as and for the purpose specified.

2. In combination with the hull or body of a submarine boat, a vertically-moving yoke extending through an opening in the top of the boat, a cap carried at the top of said yoke, a screw arranged, as shown, to elevate and depress the yoke, and a flexible trunk connected at opposite ends with the cap and with the body of the boat, substantially as shown and described.

3. In combination with the boat having the vertically-moving cylinder G and trunk F, the guard or fender *j*, surrounding said cylinder and trunk, as and for the purpose set forth.

4. In a submarine vessel, a tank or vessel, *v*, provided with flexible tubes and mouth-pieces *w*, and charged with lime-water or equivalent chemical solution, as and for the purpose set forth.

5. In combination with the boat A, having the curved rod or bar D, extending from the keel upward on the outside of the boat, as shown, a chain applied to said rod, substantially as and for the purpose specified.

JESSE JOPLING.

Witnesses:

REUBEN WILLARD,
C. W. SMITH.