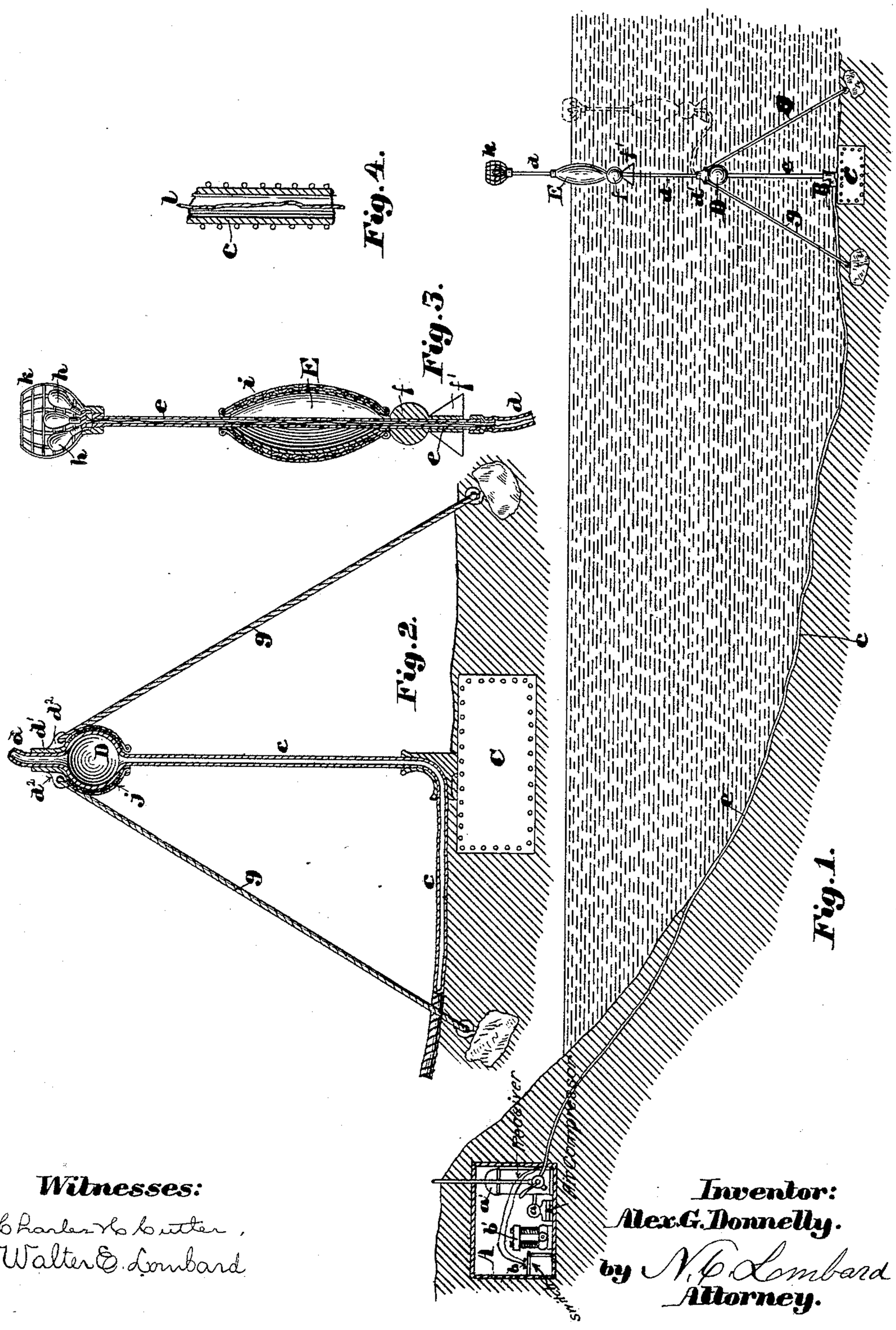
(No Model.)

A. G. DONNELLY.

MARINE ELECTRIC LIGHT.

No. 424,544. Patented Apr. 1, 1890.



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UNITED STATES PATENT OFFICE.

ALEXANDER G. DONNELLY, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO ALDEN SOLMANS, OF SOUTH NORWALK, CONNECTICUT.

MARINE ELECTRIC LIGHT.

SPECIFICATION forming part of Letters Patent No. 424,544, dated April 1, 1890.

Application filed May 4, 1889. Serial No. 309,657. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER G. DONNELLY, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Marine Electric Lights, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to marine electric lights, and is designed to render such lights practically available for use in submarine operations, and especially for the purpose of illuminating a harbor at will to detect the approach of an enemy at night; and it consists in certain novel features of construction, arrangement, and combination of devices, whereby said lights may be anchored to the bottom of a harbor, river, or other channel, and may be rendered buoyant or non-buoyant, illuminating or non-illuminating, at the will of an operator located at any safe distance therefrom on land or sea, all of which will be readily understood by reference to the description of the drawings, and to the claims to be hereinafter given and in which my invention is clearly pointed out.

Figure 1 of the drawings represents a vertical section of a portion of a harbor or channel and its shore with an operating-station on said shore, with the electric light in position for illuminating said harbor or channel. Fig. 2 is a section of a portion of the bottom of the channel, the air-conducting pipe, and one of its floats or buoyant chambers, and illustrating the anchorage of the same, drawn to an enlarged scale. Fig. 3 is a central vertical section of the lamp-cage, the main buoy, its pendent weight, and a small portion of air-conducting pipe, and showing the electric-light bulbs and the conducting-wire in elevation passing through the conducting-pipe; and Fig. 4 is a longitudinal section of a portion of the air-conducting pipe with a small piece of the electric wire in elevation therein.

In the drawings, A represents an operating-station, which may be a casemate of a fort or a separate detached room properly protected against injury from the shots of the enemy, and containing an air-compressor *a*, of any well-known and suitable construction, a compressed-air-receiving tank *a'*, an electric switch *b*, and a dynamo *b'*, or any other suitable generator of electricity, with suitable valves for controlling the flow of the air to or from the buoys, and a suitable switch for controlling the electric current. A rubber pipe *c*, of sufficient strength to withstand the pressure of compressed air required to properly manipulate the electric light, leads from the air-compressor along the bottom of the harbor or channel to the point B in said harbor or channel, where, or above which, it is desired to use the light, and at which point said pipe is made fast to the anchorage, which may be a large metal tank C, filled with sand or other heavy substance sunk at the desired point. The pipe *c* extends beyond said anchorage to and communicates with the interior of the buoy D, from the opposite side of which extends the pipe *d* of like character which passes through the metal sleeve *d'* and connects at its other end to the metal pipe *e*, having firmly secured thereon near its lower end the spherical weight *f*, which may or may not be provided with the pendent wings *f'*, as may be desired. The metal sleeve *d'* is provided with radial ears d^2, to which are connected the upper ends of the flexible stay-cables *g g*, the lower ends of which are anchored to the bottom of the channel, as shown in Figs. 1 and 2. The pipe *e* extends a considerable distance above the weight *f*, and is surrounded just above said weight by the main buoy E, which is a hollow chamber made preferably of rubber, and connected to said pipe so as to be air-tight where said pipe passes through the same. The pipe *e* has its upper end closed air-tight by a suitable non-conducting material, and carries at its upper end one or more electric-lamp bulbs *h*, containing suitable carbon or platinum burners, and within the chamber of the buoy E said pipe *e* is perforated for the passage of the air, forced through the pipes *c*, *d*, and *e*, to the interior of said chamber to expand said buoy and render it buoyant, and the escape of air from said chamber when the pipe *c* at its land end is in communication with the atmosphere. The buoy D is made preferably of rubber, in the form of a hollow

sphere, and it and the buoy E are inclosed in cages *i* and *j*, respectively, made of heavy copper wire to prevent too great an expansion of said buoys when the compressed air is forced into the same, and at the same time permit the surrounding water to bear upon the surface of the rubber buoys, so as to collapse them when the pressure within them is reduced to the pressure of the atmosphere, thereby destroying its floative power and causing the electric lamp and all its accessories to sink to the bottom of the channel. The electric-lamp bulbs are also inclosed in a strong wire-netting cage *k*, to protect them from breakage by contact with the channel bottom or other obstruction in the water. The lamp-bulbs being attached to the end of the rigid metal pipe *e*, the opposite end of which is weighted not only by the metal weight *f*, but by the pipe *d*, the light and its supporting-pipe will ordinarily be maintained in an upright position by the combined action of the floative power of the buoy E and the action of gravity upon said weight and pipe, whether said light be raised to or above the surface of the water, or sunk below said surface, so long as the pressure within the buoys D and E is sufficient to expand said buoys so as to displace a quantity of water slightly exceeding in weight the weight of the parts above the anchorage, except as said upright position may be affected by the ebb and flow of the tide or other currents of the water.

The electric burners in the bulbs *h h* are connected by a suitably insulated conducting wire or wires *l*, extending therefrom through the pipes *e*, *d*, and *c* to the dynamo *b*. The flexible pipes *c* and *d* will preferably be wound with wire to increase their strength, as shown in Figs. 2 and 4; but this is not a necessarily essential feature of my invention, as said pipes may be made of sufficient strength without such winding, if desired.

If desired, the air-compressor, reservoir, dynamo, and switch may be placed upon a vessel anchored in the harbor at a convenient distance from the point that it is desired to protect, and the whole apparatus may be operated from said vessel precisely in the same manner as from the land-station. When not desired for use, the light is extinguished by the proper adjustment of the switch at the operating-station, and the lamp is sunk to the bottom of the harbor or channel by so turning the air-controlling valve as to open communication between the interiors of the buoys and the open air.

If it is desired to illuminate the surface of the water for the purpose of detecting an approaching enemy at night, the operator at the operating-station, whether on the shore or on board a vessel or other floating station, turns the valve connected with the air-supplying pipe, so as to open communication between said pipe and the air-reservoir, when the lamp will commence to rise as soon as said buoys have been expanded, so as to displace a quantity of water equal in weight to the weight of the lamp and the parts intervening between it and the anchors, and when said buoys have been expanded to their full limit the lamp will rise above the surface of the water, while the buoy remains a short distance below the surface, said distance varying according to the state of the tide, and when this is done the operator turns the switch, so as to connect the source of supply of electricity with the wires leading to the lamp, when the immediate vicinity of the lamp and for a considerable distance therefrom will be instantly brilliantly illuminated.

This invention may be equally available for pearl-fishing and other submarine operations. If desired for use on the bottom of the harbor or other body of water, all the operator has to do is to turn on the current of electricity, and if desired at a point between the bottom and the surface of the water he turns on a sufficient quantity of compressed air to only partially expand the buoys and raise the lamp to the desired height, when he shuts off the supply of air without opening communication with the atmosphere. The air-compressor and dynamo may be located some distance from the shore operating-station with a pipe leading to the reservoir *a'*, and wires leading to the switch *b* in said operating-station, if desired, without affecting the principles of my invention.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A system of illuminating harbors or channels, comprising an electric lamp, a hollow collapsible buoy connected to said lamp and anchored to the bottom of said harbor or channel by flexible connections of sufficient length to permit said buoy to rise to or nearly to the surface of the water, an operating-station at a point removed from said buoy, a pipe leading from the operating-station to the interior of said hollow buoy, suitable circuit-wires connecting said lamp and operating-station, a source of electric-current supply, and a switch for controlling such supply, located at said operating-station, a reservoir or source of supply of compressed air through said air-pipe to said buoy, and suitable valves for controlling the supply of air to said buoy.

2. In an apparatus for illuminating harbors or channels, the combination of a rigid spar, an electric lamp mounted upon one end of said spar, a weight firmly secured to said spar at or near its other end, a hollow collapsible buoy secured to said spar between said weight and lamp, an air-pipe communicating with the interior of said buoy for supplying compressed air thereto, and suitable circuit-wires for supplying the electric current to said lamp.

3. The combination of a rigid spar, an electric lamp carried at one end thereof, a hollow expansible and collapsible buoy connected to said spar at or near its other end, and a wire or skeleton cage inclosing said buoy to limit the expansion of said hollow buoy.

4. In combination with a floating electric lamp and its buoy, and an operating-station containing a source of supply of compressed air and of electricity, and located at a point removed from said light and buoy, a pipe for conducting air to said buoy and an anchor-weight provided with an eye through which said pipe passes freely, and suitable circuit-wires located in said pipe and extending from the operating-station to said lamp.

5. In combination with a floating electric lamp and its buoy and an air-supplying pipe leading to said buoy, the sleeve d', the anchored stay-rods g, and the second buoy D, forming a section of the passage to the lamp-buoy.

6. In combination with an electric lamp, a float or buoy connected thereto, cables connecting said light and buoy with suitable anchors at the bottom of the channel, pipes for conveying air to the interior of said float, circuit-wires for conducting electricity to said lamp, and a skeleton cage surrounding said lamp to protect it from breakage when sunk to the bottom of the channel.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 15th day of April, A. D. 1889.

ALEXANDER G. DONNELLY.

Witnesses:
N. C. LOMBARD,
WALTER E. LOMBARD.