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Patented Dec. 5, 1899.

J. E. HOLLAND.
DIVING APPARATUS.

(Application filed Dec. 20, 1898.)

(No Model.)

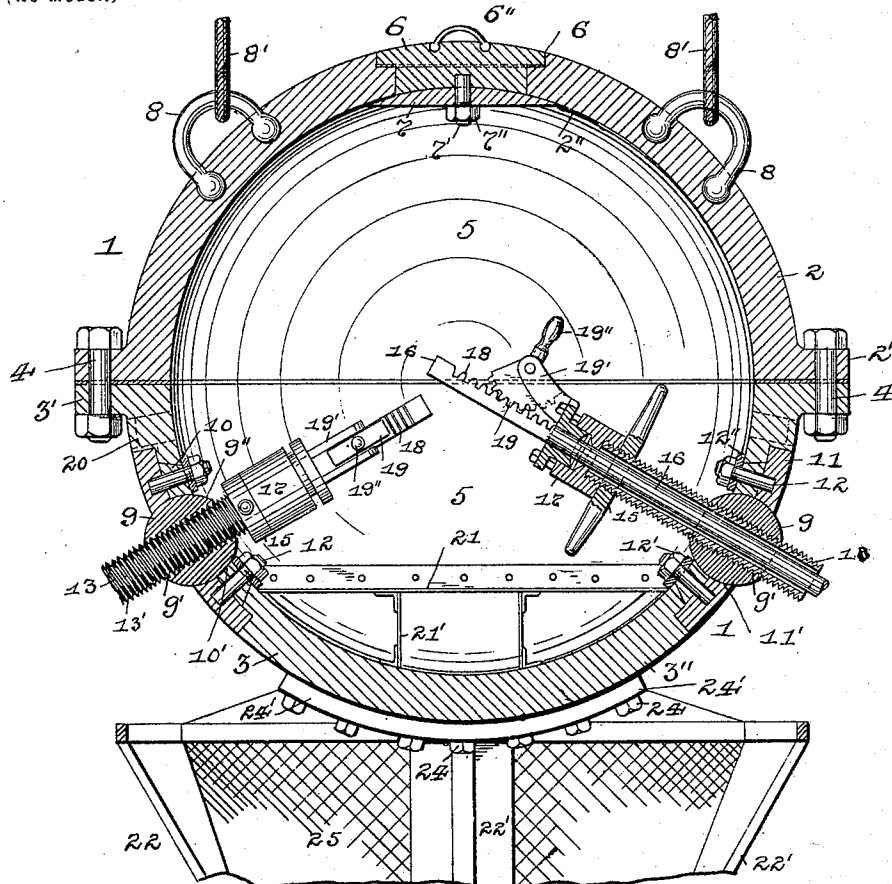


Fig. 1

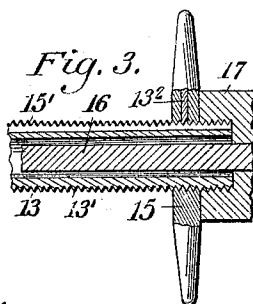


Fig. 3.

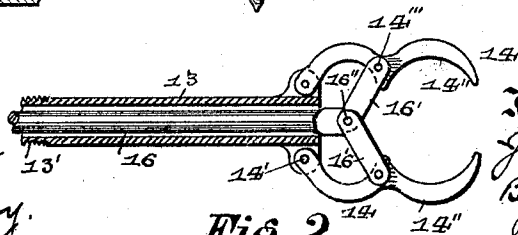


Fig. 2

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JAMES E. HOLLAND, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO ANTON LUTZ, OF ALLEGHENY, PENNSYLVANIA.

DIVING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 638,335, dated December 5, 1899.

Application filed December 20, 1898. Serial No. 699,875. (No model.)

To all whom it may concern:

Be it known that I, JAMES E. HOLLAND, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Diving Apparatus, of which the following is a specification.

My invention relates to diving apparatus, and has special reference to such apparatus as is used for deep-sea diving.

The object of my invention is to provide a cheap, safe, and effective diving apparatus which can be anchored and used by deep-sea divers in locating wrecks, grappling for objects and storing the same within the apparatus, and many other uses which the apparatus affords.

My invention consists, generally stated, in the novel arrangement, construction, and combination of parts, as hereinafter more specifically set forth and described, and particularly pointed out in the claims.

To enable others skilled in the art to which my invention appertains to construct and use my improved diving apparatus, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a vertical central section of my improved diving apparatus, showing some of the parts in full lines. Fig. 2 is a detail sectional view of one of the grappling-hooks, showing some of the parts in full lines; and Fig. 3 is an enlarged detail sectional view of one of the hand-nuts and its connections.

Like numerals herein indicate like parts in each of the figures of the drawings.

As illustrated in the drawings, 1 represents the diving-bell, which is preferably made of cast-iron in the form of a hollow ball and is cast in two parts composed of the upper section 2 and lower section 3. These sections 2 and 3 are secured together at or about the center of the bell 1 by bolts 4 engaging with flanges 2' 3' on the upper and lower sections 2 and 3, so as to form the hollow water-tight compartment 5 within the bell 1. Fitting within an opening 6' in the wall 2'' of the upper section 2 is the trap-door 6, which is provided with a handle 6'' thereon and is held in place and rendered water-tight by the convex plate 7, which fits against the bottom of

the door 6 and the inner face of the wall 2'' and is secured to the door 6 and wall 2'' by the screw-bolt 7' engaging with said door through the plate 7 and held by nut 7'' connected thereto. Cast within the walls 2'' of the upper section 2 are the eyes 8, to which are connected ropes or chains 8', which lead to the vessel or float for supporting and raising or lowering the apparatus. Fitting within the walls 3'' of the lower section 3 are the metal balls 9, which are provided with the threaded openings 9' through the same and are held in place by means of inside and outside plates 10 11 fitting within the wall 3'' of the lower section 3. The plates are provided with the concave openings 10' 11' within the same, which are adapted to engage with the exterior or convex surface 9'' of the metal balls 9, so as to form a universal joint therein for the purposes hereinafter described. Bolts 12 pass through the inside plates 10 into the outside plates 11 on each side of the metal balls 9, and nuts 12' engage with said bolts 12 and against washer-plates 12'' around the bolts 12 to hold the plates 10 and 11 and balls 9 in place. Pipes 13 fit within the metal balls 9 by means of threaded portions 13' on said pipes 13 engaging with the threaded opening 9' within the balls 9, and the outer ends of said pipes 13 are provided with grappling-hooks 14, which are pivoted at 14' to said pipes 13 and have jaws 14'' thereon. The inner ends of the pipes 13 within the compartment 5 are provided with the hand-nuts 15 thereon, which are keyed to a groove 15' in the pipes 13 by a pin 13³ and engage by a threaded portion thereon with the threaded portions 13' on the pipes 13 for raising and lowering the same and the grappling-hooks 14 thereon, as shown in Fig. 3. Fitting loosely within the pipes 13 are the bars 16, which are connected at their outer ends to the grappling-hooks 14 by means of straps or links 16', pivoted to the bars 16 at 16'' and to the hooks 14 at 14'''. These bars 16 pass through stuffing-boxes 17 on the inner ends of the pipes 13 and are provided with any suitable means for raising and lowering said bars 16 to open and close the grappling-hooks 14, such as that illustrated, which consists of a rack 18, formed on the inner end of the bars 16, which is adapted to be engaged by a segmental gear 19, sup-

ported in a bracket 19' on the stuffing-boxes 17 and provided with an operating-handle 19" thereon.

The diving-bell 1 is provided with the observation or lookout ports 20, (shown in dotted lines,) which are formed in the lower section 3 adjacent to the metal balls 9, and a platform 21 is supported by the standards 21' in the lower part of the compartment 5 for the operator to stand on. Secured to the exterior surface of the lower section 3 and hanging below the bell 1 is the tapered cage 22, which is provided with the frame 22', having the tapered anchor-point 23 secured on the lower end thereof. The cage 22 is secured by its frame 22' to the lower section 3 of the bell 1 by bolts 24 engaging with the plate 24', formed as part of the frame 22', and with the lower section 3 of the bell, and a metal netting 25 is secured around the frame 22' above the anchor-point 23 for holding the different objects therein.

The use and operation of my improved diving apparatus are as follows: The apparatus is placed within the water and supported from the vessel or float by the ropes or chains 8' leading therefrom and connected to the eyes 8 on the bell 1, and when it is desired to use the apparatus for any purpose the operator or diver enters the bell 1 through the opening 6' in the wall 2" of the upper section 2 into the compartment 5, when the trap-door 6 can be inserted into the opening 6' and the same held in place by the diver screwing the convex plate 7 tightly against the trap-door 6 and inner face of the wall 2" by means of the bolt 7' and nut 7". The apparatus can then be lowered from the vessel or float by means of the chains 8' to the position desired near the wreck to be examined or to the object to be examined or secured and the anchor-point 23 on the cage 22 take into the sea-bottom to hold the apparatus in a secured position. If the diver desires to use one of the grappling-hooks 14 for any purpose, it can be lowered by turning the hand-nuts 15 on the threaded portion 13' of one of the pipes 13 in the desired direction, which, being keyed to a groove in the pipes 13, will cause the pipe 13 to be lowered through the opening 9' of the metal ball 9, connected to the pipe 13, to the object to be raised, (which the operator can see through the port-holes 20,) when the diver can close the grappling-hooks 14 about the object by grasping the handle 19" on the segmental gear 19, and turning in the desired direction will cause the bar 16, engaging with the gear 19 by its rack 18, to be raised and draw the jaws 14" of the grappling-hooks 14 toward each other around the object to be examined or raised. After this is done the diver can raise the object to be examined by him through the port-holes 20 or place within the cage 22 by simply turning the hand-nut 15 in the opposite direction and so raising the pipe 13 and the object within and caught by jaws 14" on the hooks 14 to a position to be examined or dropped into the

cage 22, which can be accomplished by swinging the pipe 13 and connecting parts in the ball 9 to an upright position, when the diver can turn the segmental gear 19 in an opposite direction, so as to lower the bar 16 by means of the rack 18 engaging with the gear 19 and open the jaws 14" of the hooks 14 through the links 16' connected thereto and to the bar 16, so releasing the object within the hooks 14 and allowing the same to drop within the cage 22. After the object has been examined or secured within the cage 22 the diving apparatus can be raised to the vessel or float by the chains 8' and the object removed from the cage 22, as well as the diver from the bell 1, through the trap-door opening 6', as above described.

It is evident that any number of grappling-hooks can be used on the diving apparatus and any one used for the purpose. Ice can also be placed within the compartment of the bell, under the platform therein, to which an air-supply pipe can lead from the vessel or float and open into the ice, and another open-end air-exhaust pipe can lead from the ice in the compartment below the platform to the vessel or float for exhausting such air from the compartment, so that cold air can be supplied to the operator or the diver through contact of the air from the vessel or float with such ice, if desired. It is also evident that such air supply and exhaust pipes can be run down from the vessel or float and connected to the interior or compartment of the bell above the platform for supplying air thereto. It is also evident that electric wires can be run from the vessel to the interior of the bell for supplying electric light to the port-holes therein or to the compartment for enabling the diver to more thoroughly perform his work therein and to examine the objects on the exterior of the apparatus.

It will thus be seen that my improved diving apparatus is cheap and simple in its construction and operation and will not get out of order. By its use objects can be examined and secured in a rapid and easy manner and can be placed within the apparatus for the purpose of landing the same on the vessel or float carrying the apparatus.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A diving apparatus comprising a water-tight chamber or compartment having openings in the walls thereof, metal balls fitting within water-tight connections in said openings and adapted to form universal joints therein, pipes fitting within openings in said metal balls by a threaded connection, grappling-hooks on the outer ends of said pipes, and means for raising and lowering said pipes and for opening and closing said hooks from the chamber or compartment.

2. A diving apparatus comprising a water-tight chamber or compartment having openings in the walls thereof, metal balls fitting within water-tight connections in said open-

ings and adapted to form universal joints therein, pipes fitting within openings in said metal balls by a threaded connection, grappling-hooks on the outer ends of said pipes, means within said chamber or compartment for raising and lowering said pipes to and from the same, and means within said chamber or compartment for opening and closing said grappling-hooks.

3. A diving apparatus comprising a watertight chamber or compartment having openings in the walls thereof, metal balls fitting within water-tight connections in said openings and adapted to form universal joints therein, pipes fitting within openings in said metal balls by a threaded connection, grappling-jaws supported on the outer ends of said pipes, a hand-nut keyed to a groove in said pipes within the chamber or compartment and having a threaded connection therewith for raising and lowering the same, and means within said chamber or compartment for opening and closing said jaws.

4. A diving apparatus comprising a watertight chamber or compartment having openings in the walls thereof, metal balls fitting within water-tight connections in said openings and adapted to form universal joints therein, pipes fitting within openings in said balls by a threaded connection, grappling-jaws supported on the outer ends of pipes, a hand-nut keyed to a groove in said pipes within the chamber or compartment and having a threaded connection therewith for raising and lowering the same, a rod or bar within said pipes pivotally connected at its outer end to said grappling-jaws, and means connected to said rod for raising and lowering the same to open and close the said jaws.

5. A diving apparatus comprising a watertight chamber or compartment having openings within the walls thereof, metal balls fitting within water-tight connections in said openings and adapted to form universal joints therein, pipes fitting within openings in said balls by a threaded connection, grappling-jaws supported on the outer ends of said pipes, a hand-nut keyed to a groove in said pipes

within the chamber or compartment and having a threaded connection therewith for raising and lowering the same, a rod or bar within said pipes pivotally connected by links at its outer end to said jaws, a stuffing-box on said pipes surrounding said rod or bar within the chamber or compartment, a gear-rack on said rod or bar within the chamber or compartment beyond said stuffing-box, and a gear-wheel supported on said stuffing-box engaging with said rack for raising and lowering said rod or bar to open and close said jaws.

6. A diving apparatus comprising a watertight chamber or compartment, grappling-hooks universally connected to said chamber or compartment and adapted to be raised and lowered and opened and closed from said chamber or compartment, and a cage below said chamber or compartment and secured thereto.

7. A diving apparatus comprising a watertight chamber or compartment, grappling-hooks universally connected to said chamber or compartment adapted to be raised and lowered and opened and closed from said chamber or compartment, a cage below said chamber or compartment and secured thereto, and a tapered point or end on the bottom of said cage.

8. A diving apparatus comprising a watertight chamber or compartment, grappling-hooks universally connected to said chamber or compartment adapted to be raised and lowered and opened and closed from said chamber or compartment, a frame below said chamber or compartment and secured thereto, a tapered point or end on the bottom of said frame, and a wire netting or gauze surrounding said frame.

In testimony whereof I have hereunto set my hand, at Pittsburg, in the county of Allegheny and State of Pennsylvania, this 28th day of November, A. D. 1898.

JAMES E. HOLLAND.

Witnesses:

ANTON LUTZ,
J. N. COOKE.