

(No Model.)

2 Sheets—Sheet 1.

J. D. COOPER.
DIVING APPARATUS.

No. 530,398.

Patented Dec. 4, 1894.

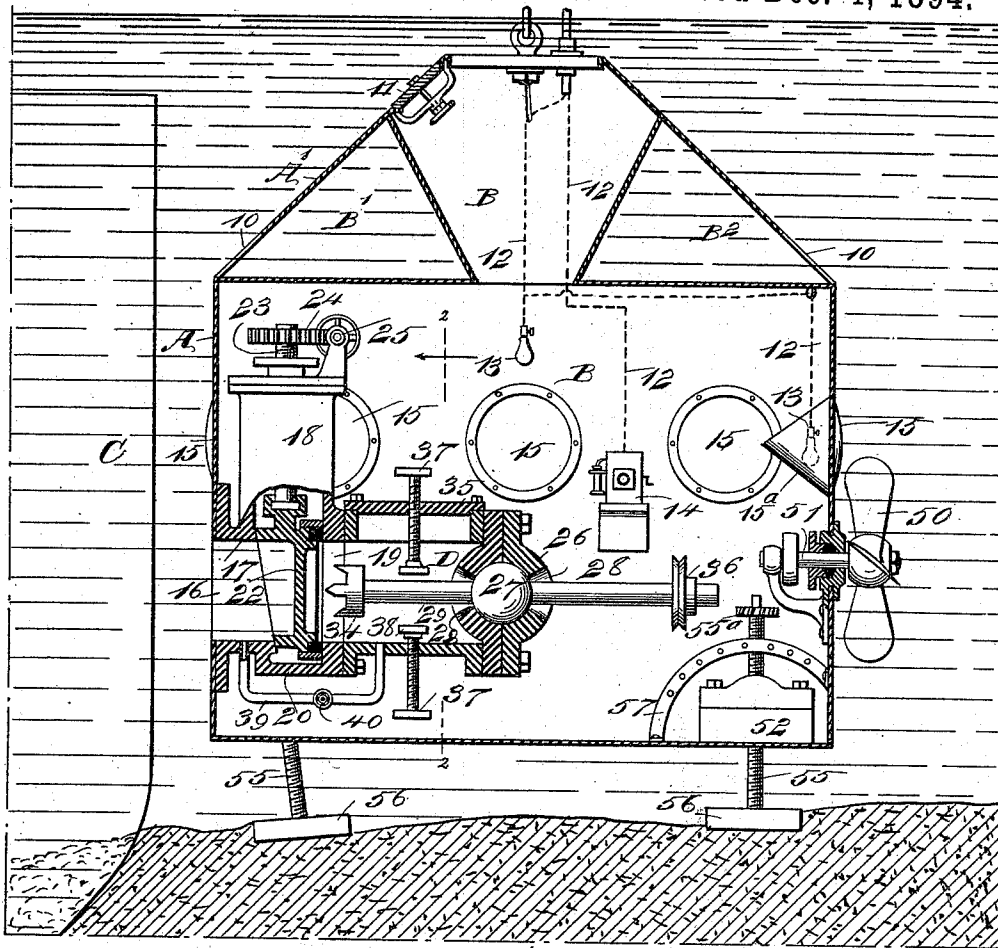


Fig. 1

Fig. 2

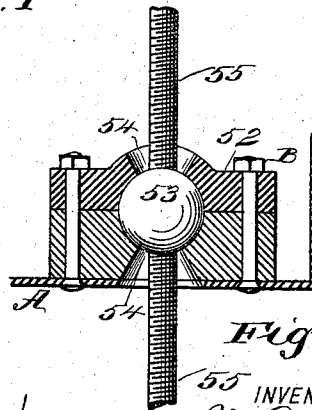
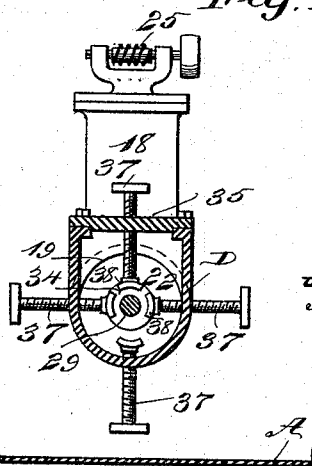


Fig. 3

WITNESSES:

John S. Ferguson
Edw. H. Cooper

INVENTOR
J. D. Cooper
BY *Munn & Co*

ATTORNEYS.

(No Model.)

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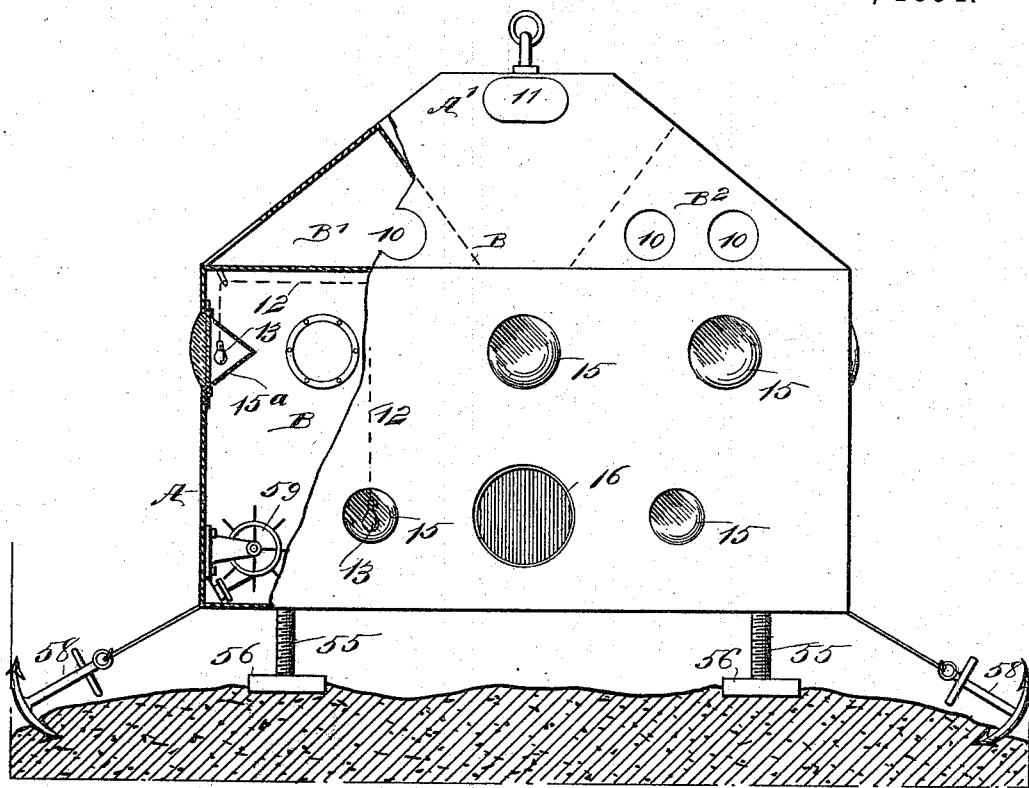


Fig. 4

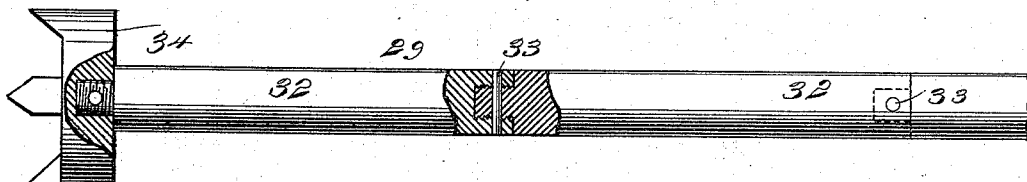


Fig. 5

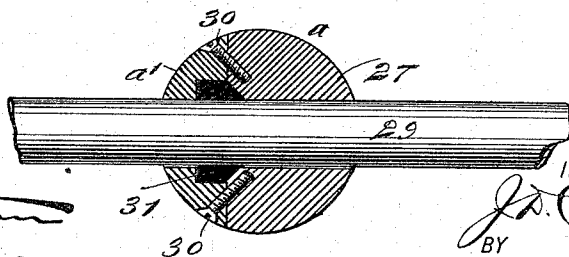


Fig. 6

WITNESSES:

John A. Dugan
John A. Dugan

INVENTOR

J. D. Cooper
BY *Munn & Co*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN DAVID COOPER, OF CHEBOYGAN, MICHIGAN.

DIVING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 530,398, dated December 4, 1894.

Application filed April 24, 1894. Serial No. 508,775. (No model.)

To all whom it may concern:

Be it known that I, JOHN DAVID COOPER, of Cheboygan, in the county of Cheboygan and State of Michigan, have invented a new and Improved Diving Apparatus, of which the following is a full, clear, and exact description.

My invention relates to a diving apparatus, and has for its object to provide a device in the nature of a house, which may be sunken to the bottom of a body of water and placed in position to operate upon any sunken object, for example, a vessel's hull, the device being capable of accommodating one or more operators.

A further object of the invention is to so construct the apparatus that a boring or other tool may be contained therein, together with suitable driving mechanism, and operated from the apparatus in an exceedingly simple and convenient manner, the tool being so carried that it may be changed without going to the surface, or whereby the tool may be directed laterally or vertically as occasion may demand while under the surface of the water.

A further object of the invention is to provide means for adjustably supporting the diving car or house, and for propelling it to or from the object to be worked upon, and further to provide means of communication with parties above the surface of the water, together with means for illuminating the space outside of the frame in which the work is to be performed.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a central vertical section through the apparatus. Fig. 2 is a vertical section through the casing of the boring or other tool employed, the section being practically on the line 2—2 of Fig. 1. Fig. 3 is a section through the bearing for one of the locking spuds. Fig. 4 is a front elevation of the diving apparatus, parts being broken away. Fig. 5 is a partial side elevation and partial

sectional view of the drilling shaft and head; and Fig. 6 is a section through the ball bearing for the drill shaft.

In carrying out the invention the house or bell A, adapted to be located beneath the surface of the water may be of any desired shape. In the drawings it is illustrated as rectangular and provided with a slanting roof A'. The house or bell is preferably divided into three compartments, a main compartment B, which includes the entire interior of the body of the house and the central portion of the roof, and two roof compartments B' and B², located at each side of the center. The compartments B' and B², are provided with a number of openings 10, since they are intended to fill with water and assist the apparatus in its descent. The roof extension of the main compartment B is provided with a man-hole, closed by a suitable cover 11, and into this extension electric wires 12, are led, some of which are connected with lamps 13, others with a telephone 14, and some are utilized to conduct electricity to a motor, (not shown,) since an electric motor is preferably employed for driving and propelling purposes.

The walls of the main chamber or compartment are provided with bull's-eyes 15, or other suitable lights or lenses, grouped in the best possible manner to render visible the surroundings of the apparatus, and the portions of the wreck C to be operated upon, since electric lamps may be placed at any one or more of the lenses, as shown in Fig. 1, in which event the lamp is preferably placed in a shield or reflector 15^a.

An opening 16 is made preferably about centrally in the front wall of the main chamber B, surrounded by an inwardly extending collar 17, having ordinarily an inclined inner end. A casing or chest D, is located immediately back of this collar, yet spaced a predetermined distance therefrom. The front of this chest or casing is open, and its front end at the top is in water-tight connection with a cylinder 18, which is likewise similarly connected with the upper portion of the collar 17.

One manner of connecting the cylinder with the casing or chest D is shown in the drawings, and consists in attaching to or forming a ring 19 integral with the chest, the ring be-

ing likewise in water-tight connection with the collar 17, especially at the bottom, by an extension 20, as shown in Fig. 1. By means of this construction it will be observed that communication is established between the exterior of the apparatus and the interior of the chest D, and since the latter is closed except at its forward end, the water can not enter the main compartment B in which the chest is located.

It is desirable to close the open end of the chest when, for example, the apparatus is under the surface of the water and is not working. This is accomplished by a gate valve 22, adapted to enter tightly and snugly between the front end of the chest D, or its ring 19 and the collar 17, as shown in Fig. 1. When opened, the valve will enter the cylinder 18, and may be operated by hand or in any approved manner. In the drawings a stem 23 is attached to the valve, and is raised and lowered by a worm wheel 24 and worm 25, the latter being turned by hand or driven by a motor; but any desired mechanism may be substituted. A bearing 26 constitutes the inner end or head of the chest or casing, and a ball 27 is fitted in said bearing in a water-tight manner, the bearing being provided with openings 28 at front and rear, and the walls of said openings are preferably inclined in direction of both sides and the top and bottom of the bearing, whereby the openings are widest at their outer ends.

A spindle or shaft 29, is passed through the openings 28, and likewise through the ball 27, as shown in detail in Fig. 6. The ball is made in two sections *a* and *a'*, secured together by screws 30, or their equivalents, and each section of the ball is provided with a chamber or recess, the two recesses or chambers, which are in alignment, containing jointly a packing 31, fitting closely around the shaft. Under this construction water is prevented from passing through the bore in the ball around the shaft, and yet the shaft may be given any required inclination. The shaft may be made in one continuous length, or in sections, as shown in Fig. 5. In this latter event the shaft sections 32 are preferably connected by a tenon joint, pins 33 being passed through the recesses and the tenons entering the same. The shaft is adapted to carry a drill head 34, or other tool, at its outer end, the tool or head being removably attached to the shaft, and it may be removed when the valve gate is closed and the apparatus is under the surface of the water, by removing a plate 35 from one side of the chest, and by this means also the shaft may be lengthened or shortened through the addition or subtraction of sections. The inner end of the shaft is provided with a pulley 36 for connection with a motor. When the shaft has been adjusted endwise in a manner to bring its head in contact with the vessel to be operated upon, the gate valve being open, and when adjustment for inclination has also been made, set

screws 37, located in the top, bottom and sides of the chest, as shown in Fig. 2, and provided with shoes 38, are manipulated to bring the shoes in guide contact with or relation to the shaft.

In order that the pressure of water may be equalized at each side of the gate valve, the interior of the chest and the space just back of the opening 16 in the house or shell, are connected by a pipe 39, provided with a valve 40 operated from within the main chamber B. After the house or bell, has been brought in substantially working position, it may be moved to or from the object to be operated upon by propellers 50 upon shafts 51 journaled in the back of the house as shown in Fig. 1. The propeller shafts extend within the main chamber B, and are driven by a suitable motor.

The apparatus is leveled, or given bodily inclination by locating bearing boxes 52 at the four corners within the main chamber, the said boxes being fitted to receive each a ball 53. The bearings are similar to the chest bearings, being provided with flaring openings 54 at top and bottom leading to the ball, and the balls may be constructed in like manner to the ball in the chest bearing. Each ball 53, is provided with a through-bore, threaded to receive a threaded shaft 55, and each shaft at its inner end is fitted with a hand wheel 55^a, or is constructed to be turned by machinery, while a shoe 56, is carried by the outer end of each screw shaft, being adapted to rest upon the bottom, as shown in Fig. 1. The screw shafts may be held in their adjusted position in many ways, that shown in the drawings consisting in locating the inner ends of the shafts between segmental guide bars 57, apertured to receive pins, serving to tie or bind the shafts whenever adjusted.

The apparatus may be anchored or shifted laterally through the medium of grapples 58, placed at front and rear, as shown in Fig. 4, the cable attached to the grapples being carried over a windlass 59 within the main chamber B.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a diving apparatus, a bell or house adapted to be sunk beneath the surface of the water, a chest located within the said bell, capable of direct communication with the water surrounding the bell, a valve capable of closing the outer end of the chest, and a shaft adapted to carry a tool, capable of substantially universal motion within the chest, and for the purpose set forth.

2. In a diving apparatus, a bell or house adapted to be sunk beneath the surface of the water, a chest located within the said bell, capable of direct communication with the water surrounding the bell, a valve capable of closing the outer end of the chest, a shaft adapted to carry a tool, capable of substantially universal motion within the chest, guide devices

adjustably carried by the chest and adapted for guided contact with the said shaft, and means for controlling the valve and driving the shaft from within the bell, as and for the purpose specified.

3. In a diving apparatus, the combination, with a bell or house having an opening in one of its sides surrounded by a collar, and a chest located within the bell at the rear of the collar, of a gate valve adapted to close communication between the said opening and the interior of the chest, a bearing located in the inner end of the chest, carrying a ball and provided with flaring openings at the front and rear of the ball, a shaft passed through the said ball and through the flaring openings into the chest, the said shaft being adapted to carry a drill head or other tool at its outer end, guide devices carried by the chest and adapted to maintain the shaft in predetermined position, and means, substantially as shown and described, for operating the said gate valve, as and for the purpose set forth.

4. In a diving apparatus, the combination, with a bell or house having an opening in one of its sides, a chest contained within the bell at the rear of the opening, a valve capable of closing communication between the opening and interior of the chest, and mechanism for raising and lowering the valve, and an equalizing tube extending from the opening within the chest, thereby equalizing the force of the water on opposite sides of the valve, of a bearing constituting the inner head of the chest, a ball located in said bearing, the bearing being provided with flaring openings at front and rear of the ball, the said ball being made in sections and provided with an interior packing, a shaft carried through the ball and packing and into the interior of the chest, the said shaft being adapted to carry a tool at its outer end, and means, substantially as shown and described, for operating the shaft, as and for the purpose set forth.

5. In a diving apparatus, the combination, with a bell or house having an opening in one

of its sides, a chest contained within the bell at the rear of the opening, a valve capable of closing communication between the opening and interior of the chest, and mechanism for raising and lowering the valve, and an equalizing tube extending from the opening within the chest, thereby equalizing the force of the water on opposite sides of the valve, of a bearing constituting the inner head of the chest and provided with front and rear flaring openings, and a ball located between the openings, a shaft constructed in detachable sections, passed through the ball and provided with a packing within the ball, a removable drill head or corresponding tool secured to the outer end of the shaft, and guide devices carried by the chest, operated from its exterior and adapted to surround the shaft, as and for the purpose specified.

6. In a diving apparatus, the combination with a bell or house provided with an opening in one side, of a casing extending inwardly from said opening, a valve for closing the outer end of the casing, and a tool shaft mounted in the inner end of the casing, substantially as described.

7. In a diving apparatus, the combination with a bell or house, of shoes carried by vertically adjustable swiveled supports, substantially as and for the purpose set forth.

8. In a diving apparatus, the combination, with a bell or house, of adjusting devices located at the front and rear thereof, each adjusting apparatus consisting of a box contained within the house, provided with a ball, bearings and flaring openings at opposite sides of the said ball, the ball being provided with a threaded bore, and an adjusting screw shaft passed through the threaded bore of the ball and the flaring openings in the box, the shaft being provided with a shoe at its lower outer end and an adjusting device at its inner end, as and for the purpose specified.

JOHN DAVID COOPER.

Witnesses:

HARRY BAKER,
ROBERT MEGGITT.