

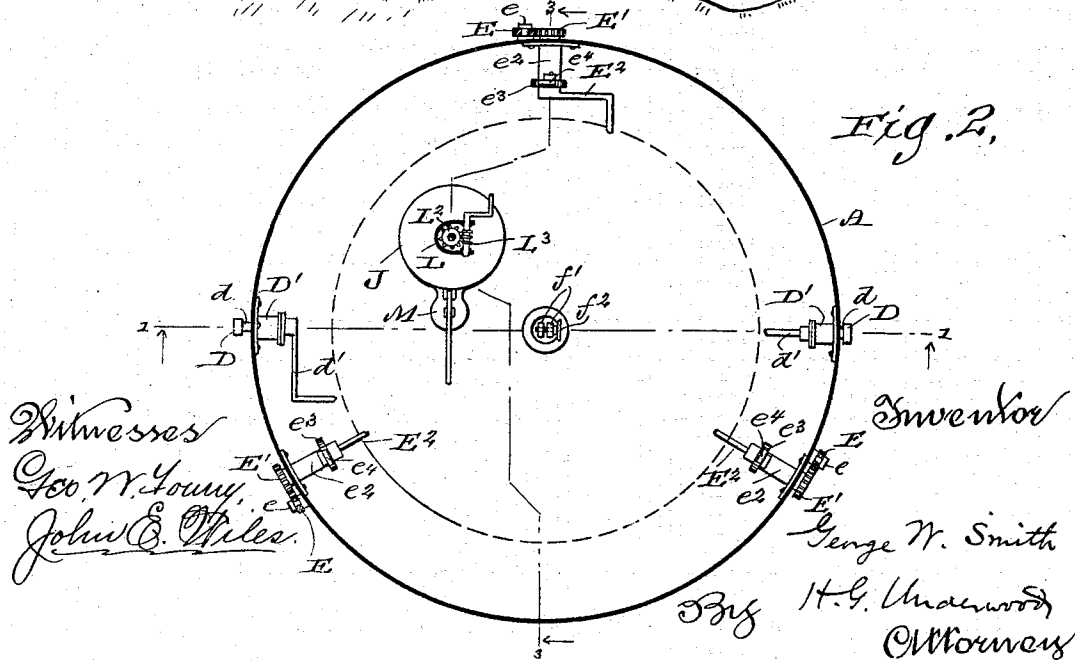
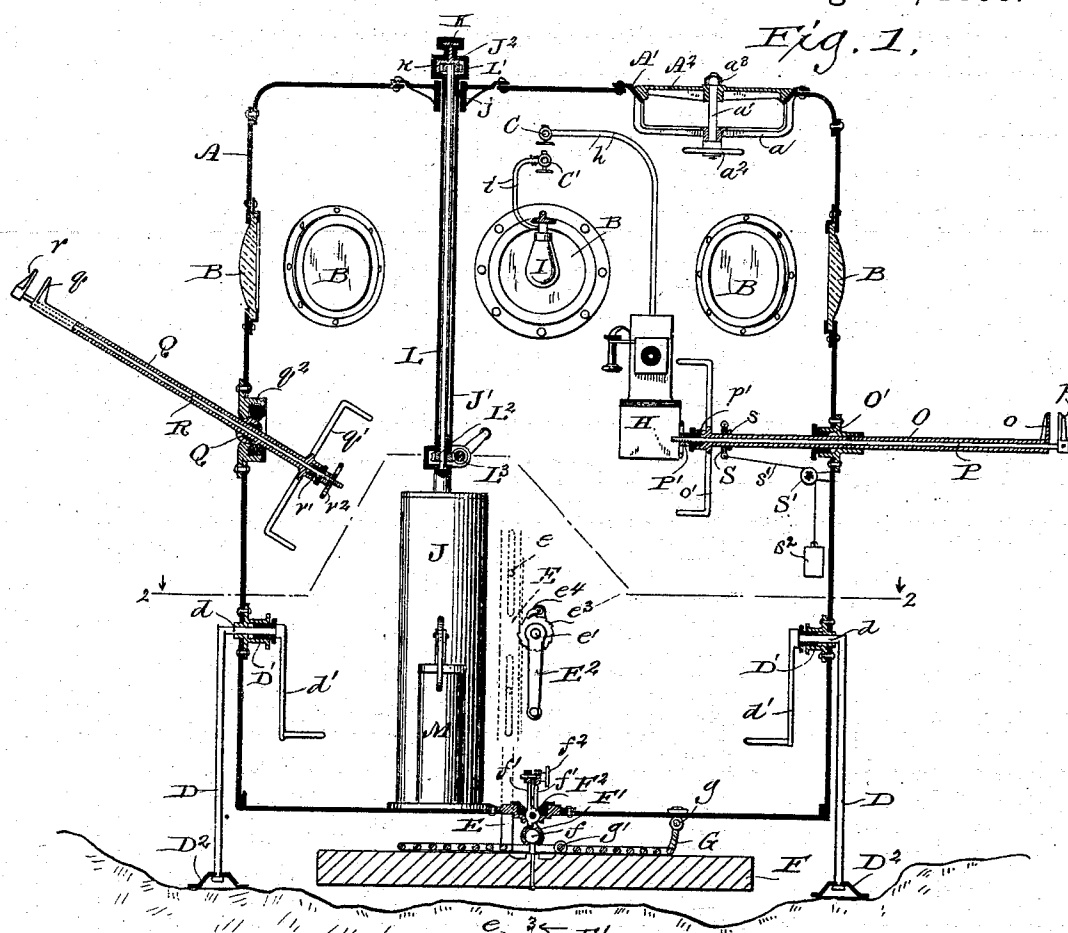
(No Model.)

2 Sheets—Sheet 1.

G. W. SMITH.
DIVING APPARATUS.

No. 503,753.

Patented Aug. 22, 1893.



Witnesses

Geo. W. Young,

John E. Miles.

Inventor

George W. Smith

By H. G. Underwood
Attorney

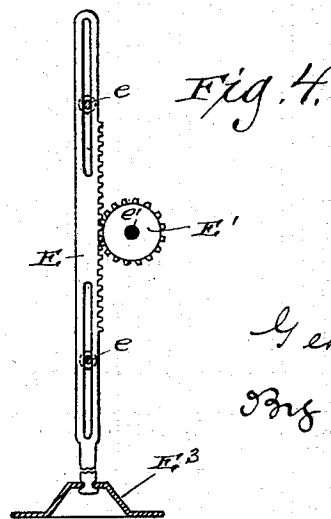
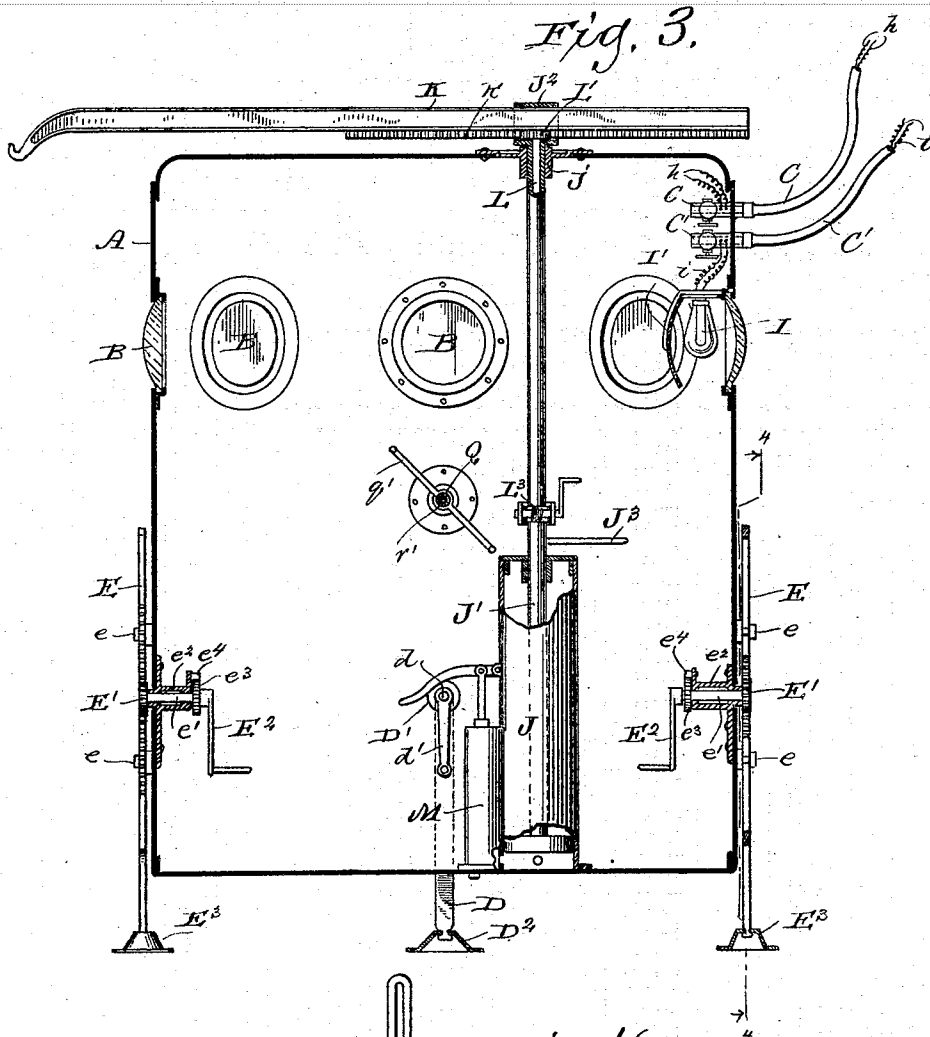
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2 Sheets—Sheet 2.

G. W. SMITH.
DIVING APPARATUS.

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Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE W. SMITH, OF MILWAUKEE, WISCONSIN.

DIVING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 503,753, dated August 22, 1893.

Application filed October 10, 1892. Serial No. 448,304. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. SMITH, a citizen of the United States, and a resident of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Diving Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to new and useful improvements in diving apparatus and consists in the matters hereinafter described and pointed out in the appended claims.

In the accompanying drawings illustrating my invention:—Figure 1 is a central vertical section of a diving apparatus constructed in accordance with my invention being taken on line 1—1 of Fig. 2. Fig. 2 is a horizontal sectional view of the same taken on line 2—2 of Fig. 1. Fig. 3 is a vertical sectional view of the same taken on line 3—3 of Fig. 2. Fig. 4 is a detail sectional view taken on line 4—4 of Fig. 3.

In said drawings:—A represents a suitable shell, which may be made of any preferred shape, but it is preferably made of substantially cylindric form in order to enable it to withstand heavy external pressure. A man hole A' is provided in the top of the shell and is closed by a downwardly seated cover A² which is held in engagement with said seat by a bolt a' passed through a yoke a upon the inside of the shell, and said cover A². A hand nut a² is provided upon the inner end of the bolt a' and another nut upon the outer end of said bolt by the removal of either of which, the cover A² may be unfastened to permit of the removal of the manhole cover by a person either outside or inside of the shell.

Suitable bull's eyes B B are provided in the side walls of the shell at convenient points to enable an occupant to look therefrom in any desired direction.

Air induction and eduction pipes C and C' respectively communicate with the interior of the shell A and lead to any suitable source of air supply.

At the sides of the shell, are provided one or more pendulous legs D, rigidly secured to the outer ends of rock shafts d which extend inward through stuffing boxes D' D' in the

shell A. These pendulous legs have suitable feet D² upon their lower ends adapted for engagement with the ground beneath the body of water in which the apparatus is being used. Cranks d' d' are applied to the inner ends of the shafts d d by means of which the legs D D may be vibrated in an obvious manner to move the shell along the ground as desired.

Legs E E are located at desired points upon the outside of the shell and are arranged in sliding engagement therewith, these legs being engaged with suitable guides e e. Suitable rack teeth are provided upon the legs E E and pinions E' E' are mounted on the outer ends of shafts e' e' journaled within stuffing boxes e² e² in the walls of the shell A. Cranks E² E² are applied to the inner ends of the shafts e' e' for rotating the same to adjust the legs vertically and ratchet wheels e³ e³ are provided upon said shafts and pawls e⁴ e⁴ upon the boxes e² e² for holding said shafts and legs in their adjusted positions. Feet E³ E³ are provided upon the lower ends of the legs E E and are adapted for engagement with the ground. By this construction, the occupants of the shell, when the apparatus is at the bottom, may, by adjusting the several legs E E, bring the feet E³ E³ at their lower ends into engagement with the bottom and adjust them so as to level the shell A in an obvious manner.

A weight F of a size sufficient to sink the shell, is detachably secured to the bottom thereof in any desired manner, as for instance, as shown in the drawings, Fig. 1, in which a ball f is provided upon the upper side of the said weight and is arranged to engage with a socket F' comprising two jaws hinged or jointed together upon the inside of a stuffing box or gland F². Any desired means may be provided for operating these jaws to grasp or release the ball f, as the arms f' f' extending to the inside of the shell A and adapted for adjustment by means of a screw f². A rope or cable G is preferably connected at g with the bottom of the shell and at its other end is operatively connected at g' with the weight. By this construction, the weight may be released opening the jaws of the socket F', the shell being thereby permitted to float to the surface of the water and the weight then drawn up separately by the rope or cable G.

An electrical signaling device, such as a telephone H is located within the shell, the circuit wires thereof being conveniently carried through the air tube C, and leading to a corresponding instrument at the surface of the water. Similarly, a suitable electric lamp I is provided within the shell and the circuit wires thereof are conveniently carried through the other air tube C', a reflector I' being located back of the lamp and said lamp being arranged at the inside of one of the bull's eyes as shown.

A cylinder J is arranged vertically within the shell A and a piston J' is arranged to move vertically therein and to slide vertically in a suitable gland or stuffing box j in the top of the shell A. At the upper end of this piston J', is provided a transverse guide J², within which a beam K is arranged to slide. A rack k is conveniently provided upon said beam and a shaft L extends vertically within the piston rod J' (which is made tubular for this purpose) and carries at its upper end, a pinion L' meshing with the rack k. At or near the lower end of the shaft L, is provided a worm wheel L² and a worm L³ is journaled in suitable bearings on the piston rod J' and meshes with said worm wheel. A lever J³ is secured to the piston rod J' and serves as a means of rotating it to bring the beam K into any desired position.

A pump M is provided and is arranged to communicate with the cylinder to enable the operator to force water into the cylinder to raise the piston when desired.

By the described construction, the piston J' with the beam K may be raised or lowered at will and by an operation of the worm L³ to rotate the shaft L, the pinion L' may be operated to extend or retract the beam K, while, by means of the lever J³, the piston may be swung round so as to give any desired direction to said beam. This piston and beam form together a crane, designed to carry any desired tools for grappling or hoisting purposes. I also provide at convenient points in the wall of the shell A, suitable stuffing boxes or glands, through which are passed sliding arms provided upon their outer ends, with suitable jaws adapted to grasp and manipulate any desired tools for handling articles upon the outside of the shell. These manipulating appliances may be made of any desired or convenient construction, but I find it convenient to employ substantially the forms of devices shown in the drawings. One of the manipulators comprises a tubular arm O, slidingly and revolvably engaged with a stuffing box or gland O' in the side wall of the shell A and provided at its outer end with a jaw o and at its inner end with an operating handle or lever o'. Within this tubular arm is engaged a longitudinally movable rod P, carrying at its outer end a jaw p arranged to oppose the jaw o, the inner end of said rod being arranged to extend inward through a stuffing box p' in the inward end of the arm O, and having

screw threaded engagement with a hand nut P' by which it may be adjusted in or out with respect to the arm O, so as to grasp a tool or other object between the jaws o p. The arm O with these jaws may be extended or retracted or rotated to any desired position by the occupant of the shell A, by means of the handle o' in an obvious manner. I also provide an arm Q carrying at its outer end a jaw q, and at its inner end provided with an operating handle q', this arm having a sliding engagement within a stuffing box or gland upon the inside of a ball Q' which is revolvably engaged within a second stuffing box q² in the wall of the shell A. A longitudinally movable rod R is located within the arm Q and carries at its outer end a jaw r arranged to oppose the jaw q, said rod extending inward through a stuffing box r' in the inner end of the arm Q and engaged with a hand nut r². By this construction, the arm Q with jaws q r may be extended or retracted at will and may be swung into any desired position with respect to the shell A by reason of the ball and socket joint between said arm and the stuffing box q².

Any means may be provided for counterbalancing the pressure of the water upon the outer ends of the arms O and Q, such for instance as illustrated in Fig. 1, of the drawings in which a collar S is loosely secured upon the outside of the arm and arranged to bear against a shoulder s thereon, and a rope or cord s' is engaged with said collar and passed over a suitable pulley S' and attached to a counterpoise weight s². By this arrangement, the manipulators will be in a condition of equilibrium and may be readily operated as desired by the occupant of the shell A.

In operating my improved apparatus, the user enters the shell and then secures the man hole cover in place and the weight being secured to the shell as shown, the apparatus is lowered into the water, the air pipes being paid out as the device descends, until the bottom is reached. By the described operation of the adjusting legs, the operator may move the device into the desired position, when it may be leveled in the manner described, by means of the vertically movable legs. When the weight rests upon the bottom the shell may be rotated about its ball and socket connection therewith in an obvious manner. When the desired position has been reached, the operator may, by the operation of the manipulators in the manner described, grasp any suitable grappling or hoisting tools that may be lowered into the water and attach them to articles to be raised, or may lift small articles and deposit them in a net or other receiver that may be lowered.

When heavy objects are to be moved, they may be handled in an obvious manner by means of the crane, from which any desired lifting or grappling tool may be suspended.

By the use of the telephone or other signaling instrument, communication may be

constantly had between the occupant of the shell A and a party at the surface of the water.

When it is desired for any reason, to rise to the surface, the occupant of the shell may cause the apparatus to float to the surface, by disconnecting the same from the weight as described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A diving apparatus comprising a suitable shell or casing provided with air induction and eduction pipes, a weight for sinking said shell or casing and provided upon its upper side with an upwardly extending stud, a clamp upon the under side of the bottom of the shell or casing and adapted for detachable engagement with said stud, and suitable mechanism extending through the bottom of the shell or casing for actuating said clamp to grasp or release said stud, substantially as set forth.

2. A diving apparatus comprising a suitable shell or casing provided with air induction and eduction pipes, a weight for sinking said shell or casing and provided upon its upper side with an upwardly extending stud, carrying a ball at its upper end, a pair of jaws each provided with a half socket and adapted for engagement with said ball, arms secured to said jaws and extending through the bottom of the shell or casing and pivotally supported therein, and suitable means within the shell or casing for adjusting said arms and the connected jaws to grasp or release said ball, substantially as set forth.

3. A diving apparatus comprising a suitable shell or casing, a weight for sinking said shell or casing, a detachable ball-and-socket connection between said shell or casing and said weight, suitable means upon the inside of the shell or casing for freeing said weight, suitable legs adjustably engaged with the outside of the shell or casing and adapted for engagement with the ground outside of the same, shafts journaled in the side walls of the shell or casing and having rack-and-pinion engagement with said legs, and crank arms engaged with the inner ends of said shafts for rotating the same to adjust the legs vertically to level the shell or casing, substantially as set forth.

4. A diving apparatus comprising a suit-

able shell or casing, a weight for sinking the same, detachably pivoted to the bottom thereof, a plurality of shafts journaled in the side walls of said shell or casing, vertically adjustable legs upon the outside of the shell or casing adapted for engagement with the ground and having rack-and-pinion engagements with certain of said shafts, other legs having rigid engagement with the outer ends of the other shafts, and adapted for engagement with the ground, and suitable crank arms upon the inner ends of said shafts for rotating the same to effect a desired movement of either set of legs to level said shell or casing or to adjust it to a desired position, substantially as set forth.

5. A diving apparatus comprising a suitable shell or casing having suitable bull's eyes in its side walls, a weight detachably secured thereto, means for adjusting said shell or casing upon the bottom, one or more tubular arms movably engaged with water tight bearings in the side walls of the shell or casing and each carrying a rigid jaw at its outer end, suitable rods or bars having sliding engagement within said tubular arms and each carrying at its outer end, a jaw opposed to the first mentioned jaw, suitable locking devices upon the inner ends of said arms for securing said rods or bars in their adjusted positions with respect to said tubular arms, and suitable counterbalance weights operatively connected with the inner ends of said arms, for counteracting the inward pressure of the water upon said arms, substantially as set forth.

6. A diving apparatus comprising a shell or casing having suitable bull's eyes in its side walls, a weight detachably secured thereto, a vertically movable standard extending upward through the top of the shell or casing and carrying a horizontal beam, means within the shell or casing for adjusting said beam horizontally, and suitable means for rotating said standard, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

GEORGE W. SMITH.

Witnesses:

JOHN E. WILES,
H. G. UNDERWOOD.