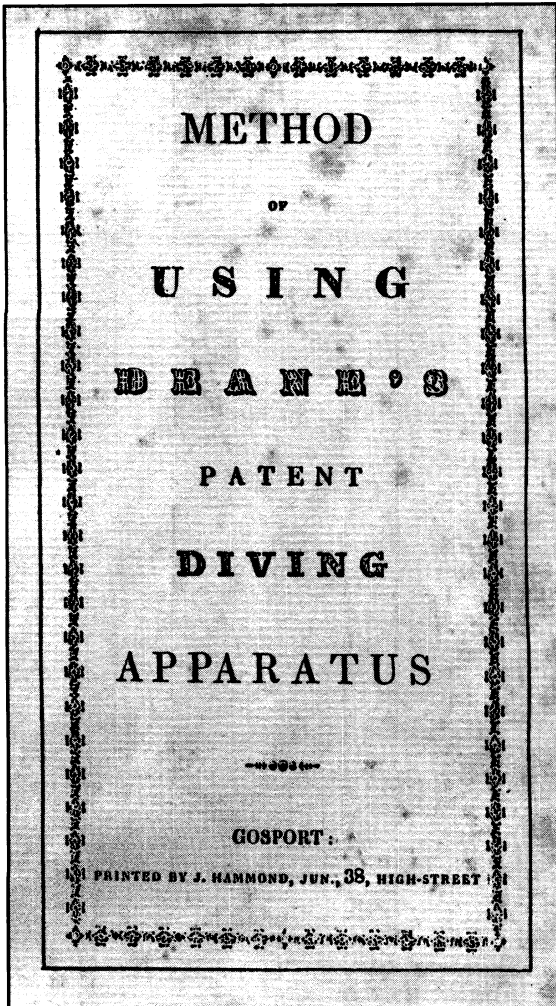


DEANE'S 1836 MANUAL

This small book is the forerunner of all publications on the practice of diving and underwater safety. It was written by the inventors of the open diving dress and it is reproduced below in its entirety.



MESSRS. C. A. AND J. DEANE Beg to caution the public against several spurious copies of their invention, the Diving apparatus; such copies being very bad imitations of the same, have, in almost every instance, failed of being either safe or effective. Messrs. C. A. and J. Deane, therefore, beg to say, that none are genuine but those constructed under their own immediate inspection, which are proved and warranted, with instructions supplied for their use.

72, North Street, Gosport, Hants; or 20, Wilson Street, Gray's Inn Road, London.

METHOD OF USING THE DIVING APPARATUS, &C.

The Patent portable and highly approved Diving Apparatus, invented by Messrs. Charles Anthony and John Deane, which they have used with so much success on the wrecks of several of Her Majesty's, and many other Ships, and which they have now in operation on the wrecks of the Royal George and Mary Rose, (the latter ship was sunk at Spithead, during an engagement with a formidable French fleet, in the year 1544, whilst defending PORTSMOUTH,) will be found to be very valuable in all submarine researches, in discovering sunken property, surveying wrecks, or sunken ships and vessels — as also the Foundations of Harbours, Piers, Docks, Bridges, &c. &c. &c.

A person equipt in this Apparatus, being enabled to descend to a considerable depth, from 20 fathoms, probably to 30, and to remain down several hours, (Mr. John Deane continued under water at one time, for the space of five hours and forty minutes,) having the perfect use of his hands and legs, is freely enabled to traverse the bottom of the sea, and to search out the hidden treasures of the deep.

Whenever it is intended to work in a Channel or Tideway, the Boat or Vessel containing the Diving Apparatus, with about seven men, should be moored over the intended object, with two or more anchors, to prevent the wind or the returning tide from shifting the Boat off the spot.

The Air-pump should then be very securely lashed to the thwarts, &c. at a proper height for the men to turn. The Fly-wheel and handles are then to be shipped, and the brass oil reservoir screwed on to either end of the air-passage, at the lower part of the air-pump; the opposite side to the wheel will be found to be the most convenient. (N.B. There is a brass cap at each end of the air-passage; one is solid, and the other has a small hole in the centre; great care must be taken that the *solid cap* is safely screwed on to the opposite end of the air-passage, to which the oil reservoir is screwed.) The pipe is then to be attached to the oil reservoir, by screwing on the end with the longest swivel—which is, that with the greatest length of copper-wire binding, and whose nut is slightly marked P, (for pump.) The other lengths of pipe will then follow as they may come to hand, according to the length of pipe required, and the last nut screwed on to the Helmet.

A prepared rope ladder, with wooden stales, and a weight at the bottom, of about a half or three quarters cwt. of iron, with a piece of small line, called the guide line, 4 or 5 fathoms long, one end made fast to one side of the ladder, about 4 feet above the weight, and the other end at liberty. (The Diver is to carry this line in his hand, to enable him in thick water to find the ladder when he wishes to ascend.) The ladder is then to be lowered to within about two feet of the bottom; the weight will then cause it to hang perpendicular and steady.

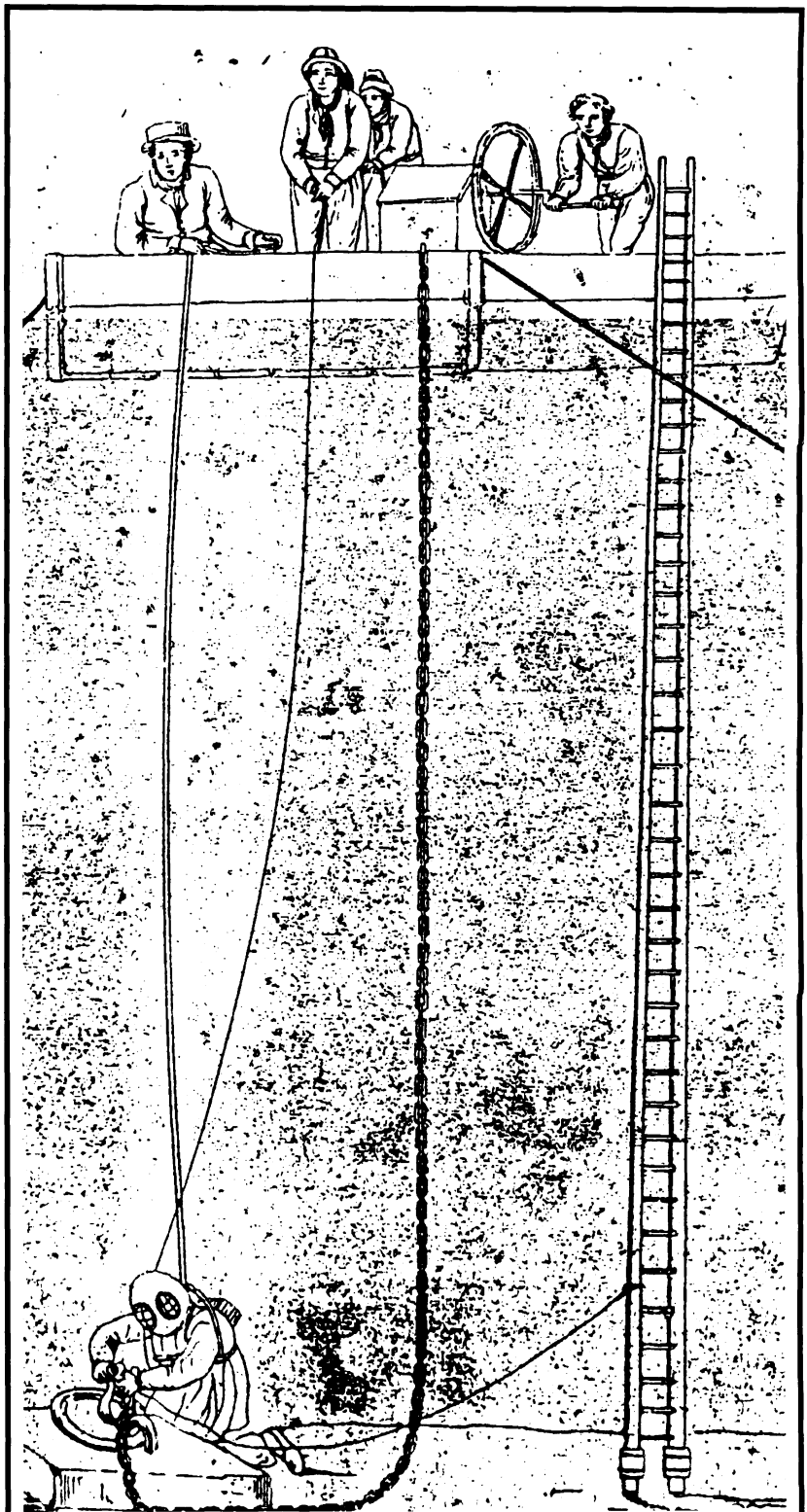
EQUIPMENT OF THE DIVER.

The Diver should dress in two pair of stockings, two drawers, and two Guernsey frocks, with a handkerchief tied round the neck, to keep the collars of the frocks well up; the green belt should then be put on, which is to keep the pressure of the weights off the chest and back. The water-proof dress is then

drawn on, and must be carefully folded, and tied securely round the wrists, with the broad webbing, and round the neck with a handkerchief, with a broad pad in it to keep the dress as high as possible. (If four or five thicknesses of some linen cloth, about two inches wide, is bound round the naked wrists, under the water-proof dress, the Diver will be enabled to bear his wrists tied much tighter, and will better exclude the water from getting up his arms.) Over the dress, which is to protect it from being cut or rubbed, must be drawn the pair of large boot stockings, the shoes, trowsers, and the canvass frock. (A deep canvass pocket, in front, tied round the waist, would be found very useful to contain the knife, and any small tools that might be necessary to take down.) A knife should always accompany the Diver, to cut away any ropes, &c. &c. with which he might become entangled.

The HELMET is next to be put on and secured, and the PUMP set in motion, and to be continued at a regular steady pace until the Helmet is taken off. A soft laid rope, about 3 inch, of the best quality, called the signal line, with an eye spliced in one end, and a mouse worked to prevent its jamming too tight round the body, is to be passed under the Diver's feet, and upwards to his armpits, and is then to be tied close to the neck of the Helmet by the piece of line that hangs for that purpose under the centre eye-glass, which is to prevent the signal line from slipping down the body, and to raise the head of the Diver, if he should fall down while under water. The signal line must be more than twice the length of the depth of the water: it is therefore advisable to have it a good length—say thirty or forty fathoms. The pipe is then to be strapped nearly in front, either on the right or left side, round the waist, by the leathern girdle.

When the Diver is thus prepared, the weights are to be put on, by two men lifting them up as high as possible on the chest, and between the shoulders, the heaviest weight being the front weight, the line, attached to the left side of it, must be rove through the two thimbles on the left side of the Helmet, and then through the two thimbles of the back weight, keeping it under the pipe, and next to the back; (if it is placed outside, its weight will collapse the pipe, and prevent the air from passing into the Helmet;) the line must then pass through the two thimbles on the right side of the Helmet, and then through the thimble on the right side of the front weight; the slack line should be all taken in to keep the weights well up, and a slip half hitch with a bow, taken with the end round its own part, just over the last named thimble, the signal line will then lead up fair, under the middle part of the front weight, and between the weight line on the left-hand side of it, and the thimble on the right. It will be found, by reeving the weight



DEANE AT WORK

COMMERCIAL DOCK MOORING. September 1833.-In the act of shackling a chain to one of the old stone moorings in the Commercial Dock, in about three and a half fathoms water, for the Commercial Dock Company. (VIEW No. VIII, from: SUBMARINE RESEARCHES ON THE WRECKS OF HIS MAJESTY'S LATE SHIPS ROYAL GEORGE, BOYNE, AND OTHERS. by Mr. C.A. Deane. J. Davy, Queen Street, Seven Dials. London 1836)

line carefully as directed, that if the Diver should be placed in difficulty, and in an instant require to discharge his weights, to ascend; by taking hold of the end of the weight line and pulling out the loop or bow, the weights would immediately fall off clear of him, without danger of entanglement. The Diver should always descend, and ascend, by the ladder, if possible; but if he should lose the ladder line, he must make the signal to be pulled up.

The Diver is then to walk steadily down the ladder to the bottom; one person, who is called the signal man, attending with the signal line in his hand, and another person attending the pipe, both of which are to be paid out or gathered in, carefully and steadily, as the Diver descends or ascends, or as he walks from or approaches the bottom of the ladder.

When the Diver is coming up, the signal man would render him great assistance in his ascent, by pulling a steady strain on the signal line; and, as soon as he arrives at the surface of the water, two persons should stoop over, and each of them take a weight by the rope handle, whilst the Diver slips the loop or bow; he will then be enabled to get in-board without difficulty.

The Diver will not be enabled to remain down while the tide is running strong; but at slack water only. But in Harbours, Bays, Docks, &c., where the water is perfectly still, he may walk about at the bottom with the greatest ease, with the boat following above, in cases of search or survey, and can remain down for many hours, if required.

CARE AND MANAGEMENT OF THE AIR-PUMP, &c.

The AIR-PUMP being constructed on the most approved principle, and of the best materials and workmanship, is not liable to be easily put out of order; and requires little more care or attention, than being kept clean, and moderately supplied with oil; so that a person possessing the most contracted knowledge of machinery, would (unless an accident occurs) be enabled to superintend the entire management of it.

All parts of the Air-pump, where there is friction or motion, should be supplied moderately with the best Neat's-foot oil; but a compound of white tallow, melted with the same quantity of Neat's-foot oil, is the best mixture for the pistons and cylinders; and if in frequent use, would require to be done about twice a week.

The pistons should be taken out occasionally, and the old tallow wiped off; and the inside of the cylinders cleaned thoroughly out, that the valves may not become clogged up, to prevent the air passing freely to the air passage, at the bottom of the broad brass plate.

The oil reservoir is to receive the oil or grease, that may be forced by the power of the air from the pump through the air passage, and to prevent its going into the pipe, as all oil or grease of any description will prove totally destructive to the pipe. The oil reservoir should occasionally be emptied, and the two brass caps of the air passage taken off, and the passage cleaned from oil and grease with some clean rag wrapped round an iron ramrod.

If, in the course of long use, the pistons should be found to work too easy in the cylinders, and not throw sufficient air, the pistons must be taken out, and, turning them bottom upwards,

pinch the six-square brass nut, which is attached to the upper brass that forms the piston, carefully in a large vice; and then, with the wrench with studs put into the two holes for that purpose at the bottom of the lower brass which forms the pistons, screw round with the sun about a quarter of a turn or more, and it will force the leather of the plunger out, exactly to fill the cylinder—and it will again work well.

If it should be wanted to unscrew the cylinders from the bottom plate, the Engine must be taken out of the chest—which is done by taking off the four small nuts on the iron frame inside, and unscrewing the two ends of the air-passage, that have square holes in them; (the right-angled square wrench is for that purpose, as also for screwing or unscrewing the brass union joints into the pipes;) the wrench, with studs, then applied to the holes at the top of the cylinders, will unscrew them.

The pipe, which is composed of India rubber and canvass, should be served over with very fine two-yarn spun yarn, to protect it from being rubbed or injured.

Great care should be taken that no oil or grease gets to the pipe or dresses, or they will be totally destroyed; neither should they be dried by heat.

In connecting the pipe together, or to the pump or helmet, be sure there is a leathern washer on each of the joints, and that they are well screwed up with the proper wrench, or the air will escape.

The pipe requires considerable attention, and with proper care would last for years; but, if improperly used, it may be spoilt in one season. No short turns or twists should on any account be taken in it; and the larger it is coiled the better. Great care is required that no person treads on it in the boat, while in use, or the pipe will be injured, and the air stopped from passing to the Diver; and when out of use, nothing should be permitted to lay on it. If, by any accident, it should become injured, or parted, so as to leak, it must be cut asunder at the wound, and one of the spare union joints, screwed in and bound securely with copper wire—taking care to lay on the wire *with the worm of the screw*, and not against it. Cold weather will cause the pipe to be very hard and stiff; but, if it is placed in a warm room or other place, it will become very soft and pliable; it must never be turned or twisted against its will.

A CODE OF SIGNALS FOR THE USE OF DEANE'S DIVING APPARATUS.

ONE PULL ON THE LINE, given either by the signal-man or the Diver, signifies that all is well—and should always be answered, with one pull, by the person to whom the signal is made. It is also made use of as a preparatory signal to command attention when any other signal is about to be made; and if that signal be not perfectly understood, it is made use of as a repeat, that is, to repeat the last signal made. It is also used to denote, "avast hoisting," or "avast lowering"—for instance, if any thing is in the act of being hoisted up, and the Diver discovers it is getting foul of himself, or entangling his pipe or signal line, he will immediately give one pull, which is, to "avast hoisting.—*This must be instantly attended to, or the consequence may prove fatal.* The same care is necessary in regard to lowering. And after such signal has been given, neither the hoisting nor the lowering is to be re-commenced, until the proper signal is given,

either to hoist or lower, according as the Diver may require. This is a very important and useful signal, and should pass from the signal man to the Diver about every five minutes, to enquire, if all is well; as also, to give notice to the Diver, that the article is hoisted up safe, in order that he may come to his work again—as it is most advisable that he should always stand from under during the time of hoisting any thing of great weight or bulk.

TWO PULLS ON THE LINE signifies, to lower away whatever the Diver has made a signal for, whether rope, chain, slings, basket, &c. &c., which must be lowered very steadily and carefully—but not till the Diver makes the signal for that purpose, and then, with the most intense watchfulness for the one pull, to avast.

When the Diver has no ropes or chains down, and he gives two pulls, to lower, it is to denote the ladder must be lowered a little, to enable him to step from it on to the ground—or that it is not low enough for him to reach in order to ascend.

THREE PULLS ON THE LINE is to pull up or hoist away whatever the Diver has made a signal for, and, of course, is the reverse of the two pulls for lowering—and requires equal attention as the one pull, for avast: it refers also, to the hoisting of the ladder when it touches the ground, in which state it will be found very difficult to ascend.

FOUR, FIVE, OR SIX PULLS ON THE LINE, may indicate a rope, chain, basket, slings, or tools of any description, according to the nature of the work, as may be agreed upon between the Diver and the signal man.

CONSTANT AND INCESSANT JERKING AND PULLING on the signal line, or pipe, by the Diver, signifies, that he must be instantly pulled up: and the same signal, made by the signal man to the Diver, denotes, that he is immediately to come up.

The signal man, as also the person attending the pipe, should hold them in their hands clear out from the boat's side, so as almost to be enabled to know what the Diver is doing, and to feel distinctly, when he stoops down or rises up; and to "pay out" as he walks away, or gather in the slack as he approaches. If a quantity of the pipe and line is suddenly snatched through the hands of the attendants. it is to be supposed the Diver has fallen down, and must be instantly hauled up, unless he makes a signal to the contrary.

THE SIGNAL MAN is required to be very careful and steady: and neither visitors or other persons should, on any account, be made acquainted with the mode of signaling, nor suffered to interfere or converse with him, to divert his attention from the Diver.

Whenever the Diver gives the preparatory signal, the pipe and line must be equally noticed, to see on which of them the signal will be made: and if the signals are made steady, and as long as the Diver's arms will admit of, few mistakes will ever occur. But the signal man should be very careful that he does not pull strong enough to lift the Diver off his legs, which might occasion some confusion and difficulty.

ALL the foregoing signals should be made on the signal line, which is expressly for that particular purpose only; and nothing should on any account be sent up or down by it—excepting a small line, the signal for which, is to be made on the pipe, (see two pulls on the pipe,) and then sent down by the signal line. This line is for the purpose of hauling down a larger rope, chain, basket, or anything else that the Diver may require.

And the slack signal line is to be hauled up, as soon as the end of the small line comes to the hand of the Diver, and he gives a signal for that purpose.

If the signal line is improperly used for hauling ropes and implements up and down, and should in any way become entangled, the communication between the Diver and the signal man being entirely cut off, the consequences might become alarming, and, in some instances, prove fatal to the Diver.

SIGNALS TO BE MADE ON THE PIPE.

ONE PULL ON THE PIPE, to be made by the Diver, signifies, that he requires more air. The attention of the signal man, or other superintendant, must then be immediately directed towards the pump, and see that it is turned a little faster.

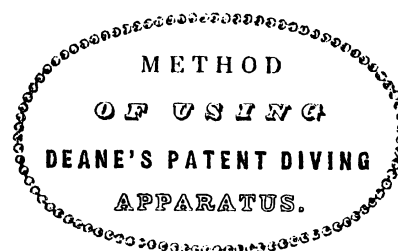
TWO PULLS ON THE PIPE indicates, that he requires a small line to attach to something as a mark, or buoy line; or to send some trifling article up by; or, by which he will haul down a larger rope, or chain, &c., &c., that he has made, or intends to make, a signal for: and, as soon as he receives the larger rope, or chain, the small line must be hauled up out of his way.

N.B. No person should, on any account whatever, be suffered to descend in the Diving Apparatus, or to attend the signals, unless they are perfectly sober, calm, and collected; and not then, unless they thoroughly understand all the signals, and can repeat them without hesitation.

The Diver must not forget to take the guide line with him, which is fast to the bottom of the ladder. And he should particularly remark on which side it is fixed, as a guide for his coming up the proper side of the ladder.

N.B. The air-pump is so constructed, that it may be used either with or without the double purchase. If used without, the brass tooth and pinion wheels, the iron carriage and spindle, must be taken off, and the fly-wheel and handles shipped on the three throw crank.

J. Hammond, Jun., Printer, Gosport.



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*The reproduction of the is manual is made possible by the generosity of a friend of the HDSUSA who wishes to remain anonymous.
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