

No. 650,134.

Patented May 22, 1900.

H. W. PHILLIPS.

APPARATUS FOR SUBMARINE PIPE LAYING.

(No Model.)

(Application filed Jan. 9, 1900.)

3 Sheets—Sheet 1.

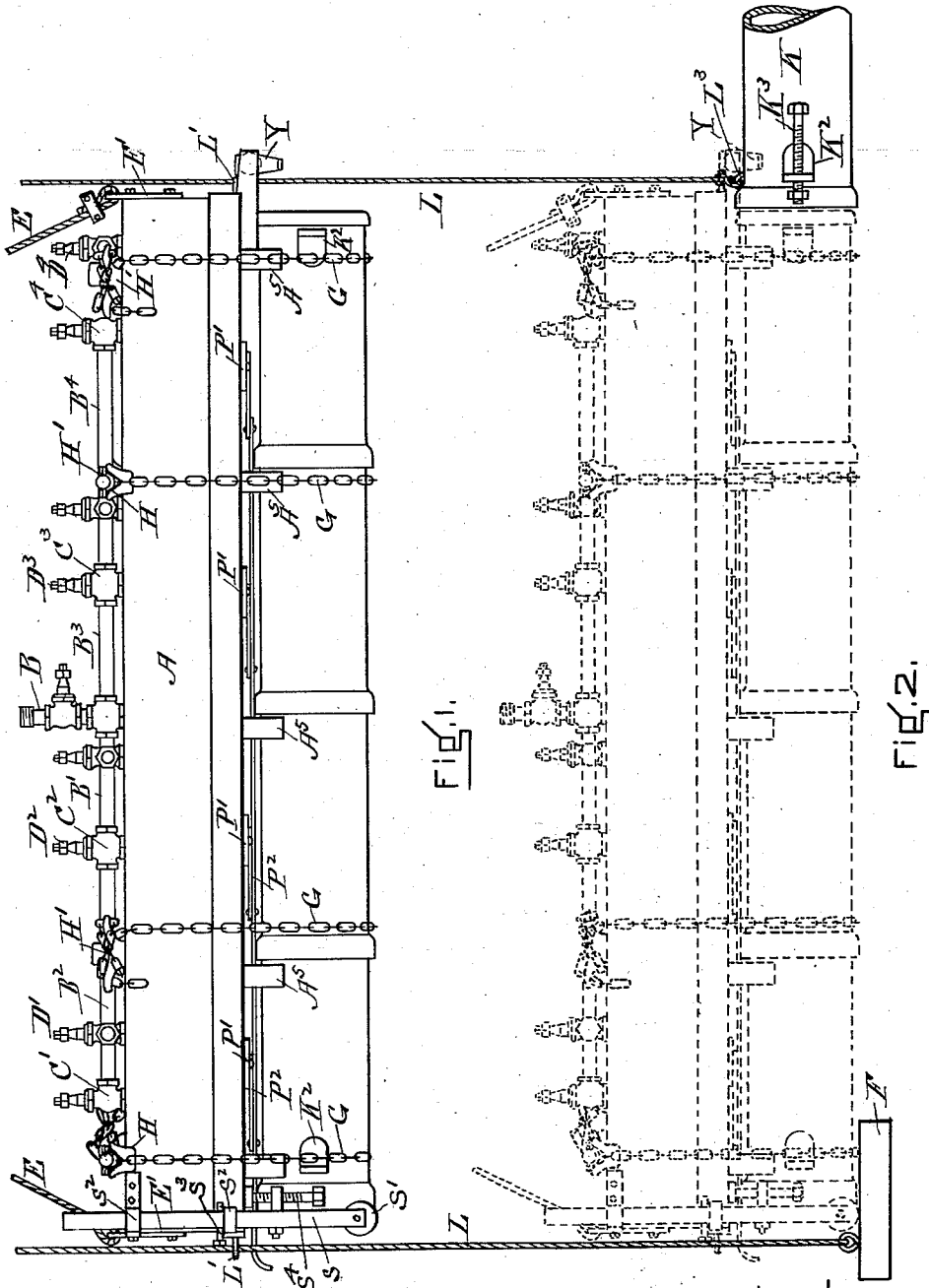


FIG. 1.

FIG. 2.

WITNESSES
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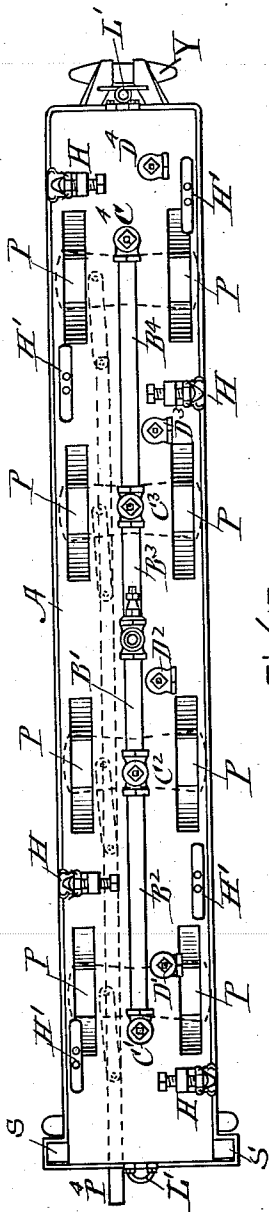


FIG. 3.

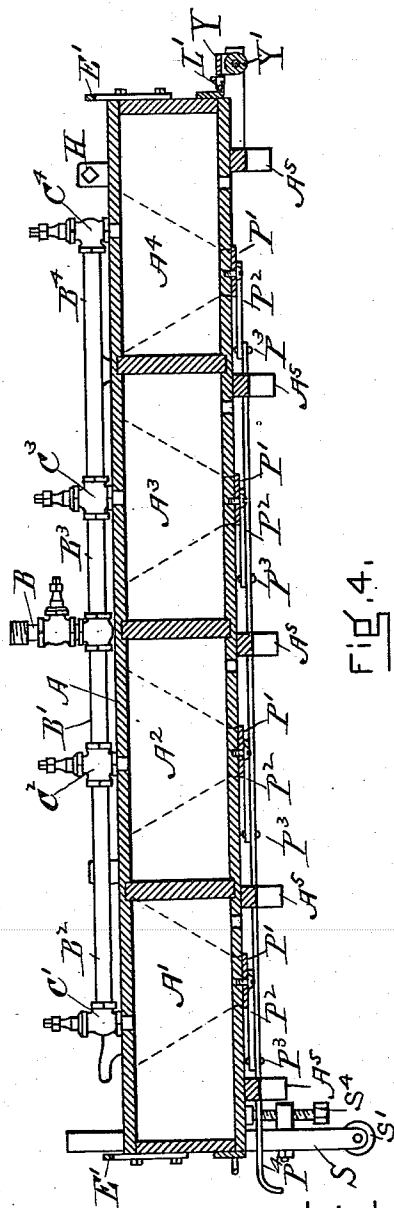


FIG. 4.

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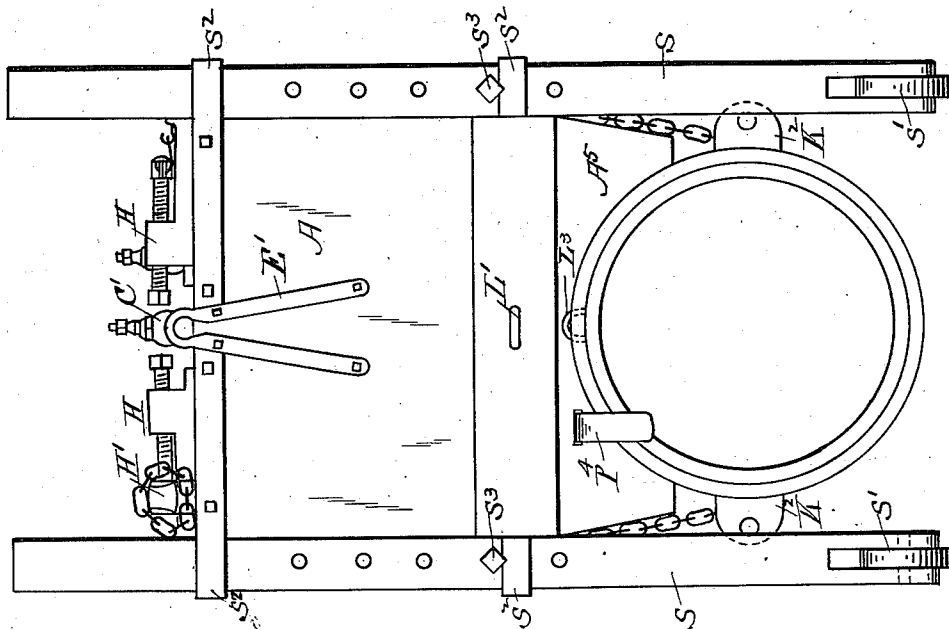
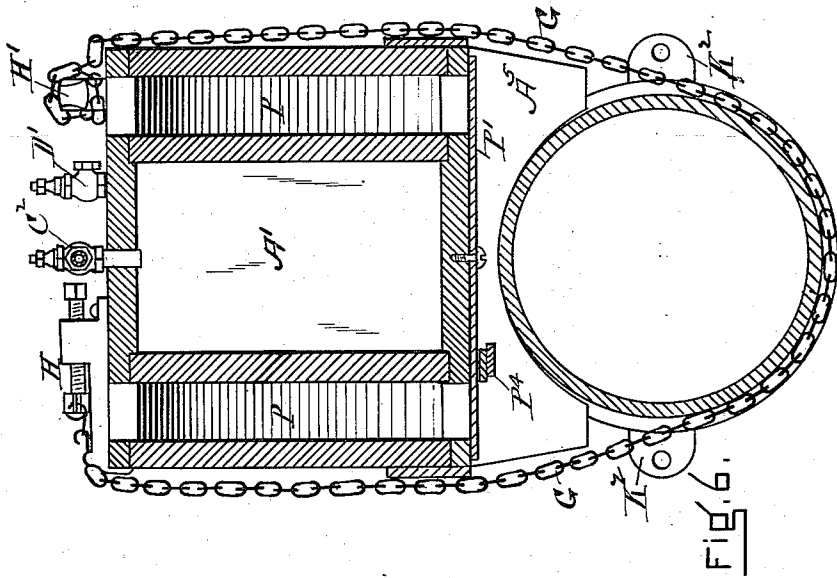
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3 Sheets—Sheet 3.



WITNESSES

Frank G. Parker
William S. Perry

FIG. 5.

INVENTOR

Hiram W. Phillips

UNITED STATES PATENT OFFICE.

HIRAM W. PHILLIPS, OF QUINCY, MASSACHUSETTS.

APPARATUS FOR SUBMARINE PIPE-LAYING.

SPECIFICATION forming part of Letters Patent No. 650,134, dated May 22, 1900.

Application filed January 9, 1900. Serial No. 894. (No model.)

To all whom it may concern:

Be it known that I, HIRAM W. PHILLIPS, of Quincy, in the county of Norfolk and State of Massachusetts, have invented a new and useful Improvement in Apparatus for Submarine Pipe-Laying, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to an apparatus for floating and otherwise sustaining, guiding, placing, and uniting heavy pipe under water; and it consists in an air-tank preferably divided into compartments and provided with inlet and outlet valves and pneumatic devices for controlling the amount of air and water in the said tank, also in devices for attaching the pipes to be laid to the tank, and also in devices for sustaining and guiding the tank and its connected pipe, and, in some cases, in gravel and sand carrying pockets combined with the tank.

The object is to construct an efficient and easily-controlled apparatus for laying heavy pipe under water. This object I attain by means of the mechanism shown in the accompanying drawings, in which—

Figure 1 is an elevation showing one of my tanks with a section of pipe attached, the whole suspended and ready for submersion. Fig. 2 indicates by dotted lines the whole submerged with the section of pipes in line and in connection with the previously-laid pipe, which is indicated by full lines. Fig. 3 is a plan of one of my tanks. Fig. 4 is a vertical longitudinal section of the same. Fig. 5 is an end elevation, enlarged, of one of my tanks with pipe attached. Fig. 6 is a cross-vertical section of the same.

In the drawings, A represents a tank made of any suitable material and is divided into air-tight compartments A¹ A² A³ A⁴. (See Fig. 4.) An air-supply pipe B leads from an air pump or compressor, conveniently located, to the pipe B¹ B² B³ B⁴, and this pipe has valve connections C¹ C² C³ C⁴ with the compartments A¹ A² A³ A⁴, so that any desired amount of air can be forced into the several compartments. Outlet-valves D¹ D² D³ D⁴ are provided for allowing the air to escape from the upper parts of the compartments. An opening is also made in the bottom of each compartment for the admission of water

when it is desired to lessen the buoyancy of the tank.

As desirable adjuncts to the buoyant tank I form receptacles for sand, gravel, or other materials. These I term "pockets," and have designated them in the drawings by P P. They are made large at the top and small at the bottom, as indicated by dotted lines in Fig. 4, and are each provided with sliding doors P¹ P', Fig. 4. These doors are all connected by links P² P² and pivots P³ P³ to a rod P⁴, by the aid of which all of the doors may be opened or closed and their contents discharged or retained.

The ropes E E are attached to the end of the tank by bent iron straps E' E' or by any convenient means and are used for suspending and controlling the tank from on board the attendant vessel or float-stage. The guide-ropes L and I. (see Figs. 1 and 2) pass through fair-leaders L' L', one at each end of the tank. The lower end of one of these ropes is attached to the end of the previously-laid pipe K by means of a loop L³, and the lower end of the other is attached to a portable anchorage-block. (See F, Fig. 2.) The portable anchorage-block is used for convenience in adjusting the free end of the pipe and is placed in position before the pipe is lowered and is removed as soon as the pipe is secured in its position. The spuds or legs S S at the end of the tank are adjustable vertically by any convenient mechanism and are held in place by socket-pieces S² and pins S³. Wheels S' S' are placed at the lower ends of the spuds and are adapted to rest on the portable anchorage-block F. For attaching the section of pipe to the tank I have chains G G, each attached at one end to one of the cleats H' H' and at the other end to screw-swivel take-up devices H H. A number of inverts or brackets A⁵ are attached to the bottom of the tank and serve to hold sections of pipe in place.

A yoke-piece Y is placed at the end of the tank and is adapted to adjust the tank in relation to the previously-laid pipe K. (See Fig. 2.) A friction-wheel Y', Fig. 4, is connected with the yoke Y to facilitate movement on the pipe. The lugs K² and screw-bolts K³ are used for the purpose of permanently connecting the pipes to each other.

The method of using my apparatus is as follows: The number of pieces of pipe desired to be laid at one time are placed in line upon an elevator-like arrangement, so con-
 5 trived that when the several pieces of pipe have been connected together it can be lowered to the desired depth below the water's surface, or the pipe may be put overboard upon the cradle of a marine railway or in
 10 localities where the tides rise and fall sufficiently, the several sections of pipe may be connected near low-water mark when the tide is down and be transferred when the tide is up. When the pipe to be laid has been sub-
 15 merged so there is sufficient depth of water above it, the pipe-laying device is floated along over it, and when rightly located the air-escapement valves D' D² D³ D⁴ at the top of the tank A are opened and the space which
 20 the escaping air vacates is quickly occupied by water, which comes in through openings at the bottom of the tank. The tank is thus relieved of buoyancy until it settles down and the invert A⁵ A⁵ bear upon the top surface
 25 of the pipe to be laid. The air-escapement valves are then closed and the pipe-supporting chains G G, which were put beneath the pipe and conveniently triced up before
 30 the pipe was submerged, are transferred to the tank. One end of each chain is attached to a swivel take-up screw device H and its other end is belayed to a stout cleat H' on
 the opposite side of the deck of the tank. When all the pipe-supporting chains G G
 35 have thus been secured and drawn evenly and tightly by means of the several swivel take-up screws H, the whole is further submerged until the flotation of the tank overcomes the
 40 force of gravitation. Then the tank, having the joined sections of pipe suspended beneath it, is towed to the place of the laying. As stated, the tank is constructed with several transverse bulkheads located at
 45 one from another. Their purpose is to prevent water from flowing too much to one end, which would cause it to maintain an uneven balance. At each end of the tank a guide-rope L is passed through fair-lead-
 50 ers L' L'. The lower end of one of these guide-ropes is made fast to the loop L³ at the end of the pipe K, previously laid. The lower end of the other guide-rope is secured to a portable anchorage F, Fig. 2, which has been carefully
 55 placed. The upper ends of these guide-ropes are led over timbers or cat-heads, which project over the side of a vessel securely moored over the spot where the pipe is to be sunk and hauled taut from the deck of said vessel. By
 60 ropes attached to the straps E' E' and leading from the derrick-boom or capstans of the before-mentioned vessel the descent of the tank and the attached pipe is governed. When all is ready, the air-escapement valves are again opened and water is allowed to further
 65 displace the air within the tank until its deck goes below the water's surface. Then as the whole descends its even avoirdupois is main-

tained by forcing air into the tank by means of air-hose connected to an air-compressor upon the deck of the vessel moored over the
 70 spot. Otherwise, as depth is increased, the increasing pressure forces the air within the tank into smaller space, thus detracting from its buoyancy. The device as it goes down,
 75 following the lead of the guide-ropes, finds the place intended for it. The yoke Y at the one end crowns over the previously-laid section of pipe, and the roller Y at the center of the yoke bears upon the top of said previously-laid pipe. At the spud end of the tank the
 80 wheels S' S' at the bottom of the spuds S S bear upon the surface of the portable anchorage. By means of screws S⁴ S⁴, attached to the spuds, they may be operated to elevate or depress the outer end of the tank. When
 85 the section of pipe supported is at the proper elevation and in line with the previously-laid sections, it may readily be connected by means of screw-bolts K³, passed through apertures in lugs K² intended for the purpose, said lugs
 90 being a part of the make-up of the pipe, or otherwise. When the supported section of pipe has been satisfactorily connected, then further reduce the buoyancy of the tank by letting air escape until the loss of buoyancy
 95 shall equal the weight of gravel in the gravel-pockets. Then open the gravel-pocket gates, and the escaping gravel will be conveniently deposited for tamping beneath and along the
 100 under sides of the pipe. When the tamping has been done, again open the air-escapement valves and let it fill with water. Now disconnect the pipe-supporting chains and the tank may be readily brought to the water's
 105 surface, the idea being to have the tank just heavy enough to sink when filled with water and unloaded, so that divers may work about it without fear of its inadvertently floating
 110 to the surface, thereby entangling the diver's air-hose or life-lines or other gear. This object is effected by ballasting.

The apparatus may of course be operated by means of pumping water from the tank and permitting the air to enter by means of
 115 air-hose led from above the water's surface.

I claim—

1. In an apparatus of the character described a hollow air-holding tank of controllable buoyancy and mobility provided with brackets, as A⁵, whereby the sections of pipe
 120 are held laterally, means for attaching and detaching sections of pipe substantially as and for the purpose set forth.
2. In an apparatus of the character described a hollow air-holding tank of controllable
 125 buoyancy and mobility, having means for attaching and detaching sections of pipe and having attached pockets for carrying gravel or sand and the like, and discharging-doors at the bottom of said pockets substantially as and for the purpose set forth.
3. In an apparatus of the character described a hollow air-holding tank, having a plu-
 130 rality of compartments, of controllable buoy-

ancy and mobility, a yoke-piece, as Y whereby the tank is adjusted to the previously-laid pipe, and means for temporarily connecting and securing sections of pipe to the said tank substantially as and for the purpose set forth.

4. In an apparatus of the character described a tank of controllable buoyancy and mobility having means for attaching and detaching sections of pipe to be laid and a guide-rope adapted to direct the movement of the apparatus so as to bring the pipe to be laid in conjunction with the previously-laid pipe substantially as and for the purpose set forth.

5. In an apparatus of the character described a tank controllable as to buoyancy and mobility, in water, and having means for attaching and detaching sections of pipe; in combination with a guide-rope and a tempo-

rarily-fixed anchorage-piece substantially as and for the purpose set forth.

6. In an apparatus of the character described a tank controllable as to buoyancy and mobility, and means for attaching and detaching sections of pipe; in combination with adjustable "spuds" or legs and a temporarily-fixed anchorage-piece substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 6th day of January, A. D. 1900.

HIRAM W. PHILLIPS.

Witnesses:

FRANK G. PARKER,
EDWARD S. DAY.