(No Model.) 2 Sheets—Sheet 1.

D. WELCH.

STEERING GEAR FOR VESSELS.

No. 452,742. Patented May 19, 1891.

Fig.1.

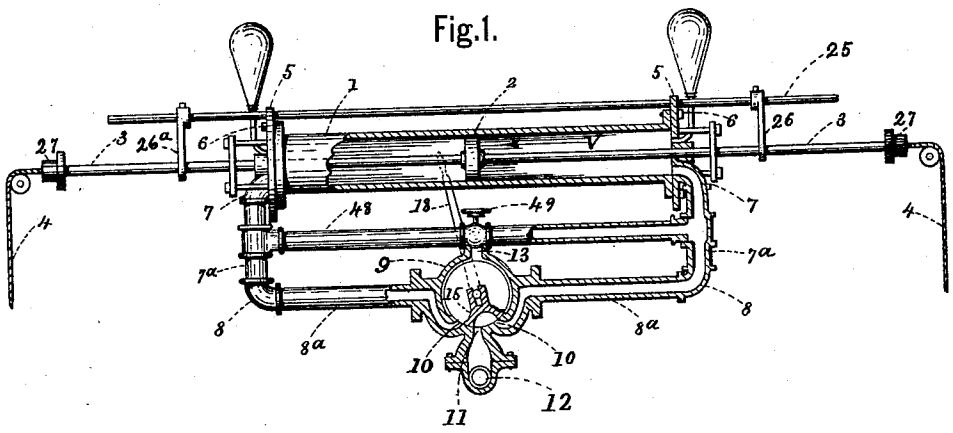


Fig.2.

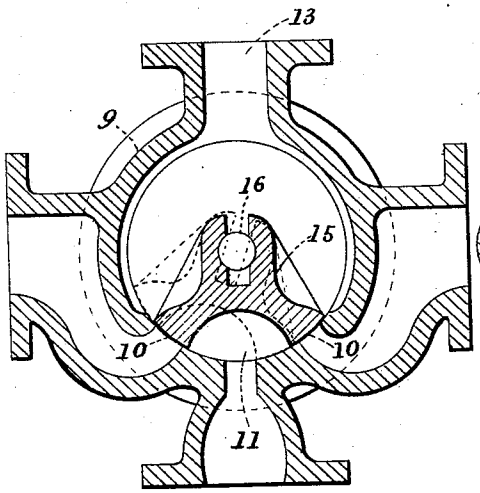
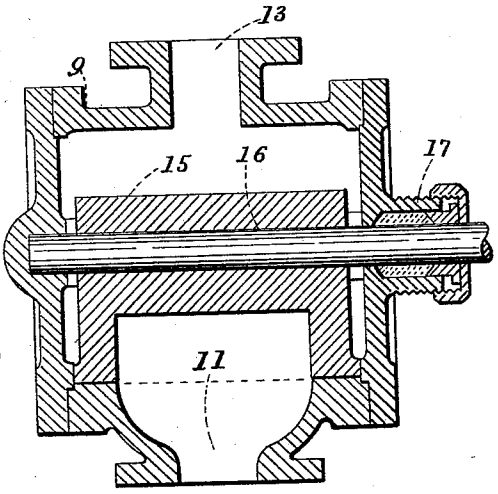


Fig.3.



Witnesses.

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Harriet Johnson

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By James Sangster,

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

D. WELCH.

STEERING GEAR FOR VESSELS.

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Fig.4.

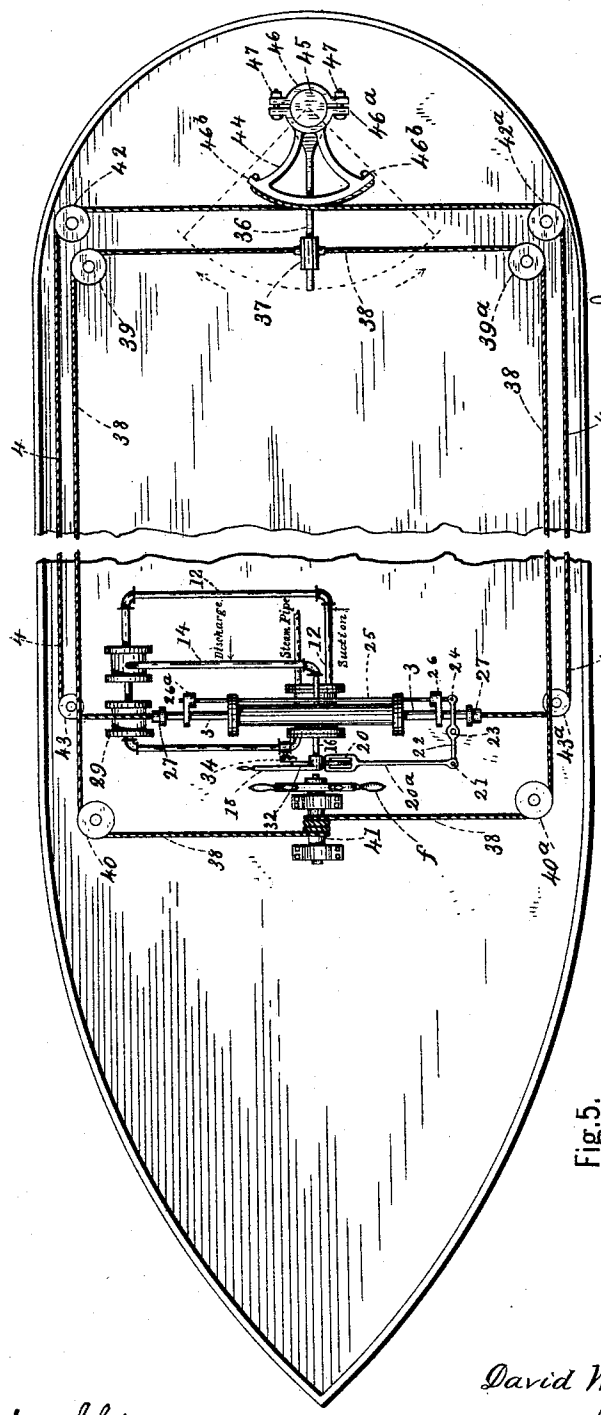


Fig.6.

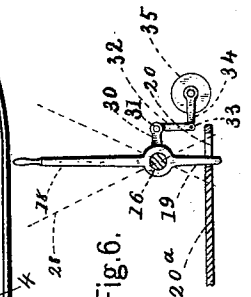
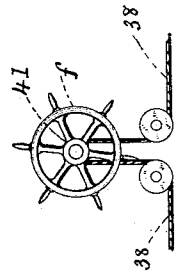


Fig.5.



Witnesses.

J. M. Caldwell.

Harriet Johnson

David Welch Inventor.

By James Sangster

Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

DAVID WELCH, OF BUFFALO, NEW YORK, ASSIGNOR OF ONE-HALF TO ERNEST L. PARRISH, OF SAME PLACE.

STEERING-GEAR FOR VESSELS.

SPECIFICATION forming part of Letters Patent No. 452,742, dated May 19, 1891.

Application filed June 17, 1890. Serial No. 355,730. (No model.)

To all whom it may concern:

Be it known that I, DAVID WELCH, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Steering-Gear for Floating Vessels Operated by the Combined Action of Steam and Water, of which the following is a specification.

My invention consists in certain improvements in steering-gear operated by hydraulic pressure and to certain details of construction relating thereto, all of which will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a detached sectional elevation of a hydraulic pump, its valve, and connections, showing the valve in position for admitting liquid to the piston in the direction of the arrow *v*. Fig. 2 is an enlarged transverse section through the valve. Fig. 3 is an enlarged longitudinal central section through the valve. Fig. 4 is a top plan view of two portions of a vessel, showing a similar view of my improvement connected therewith. Fig. 5 is a front view of the usual steering-wheel, showing the cables connected therewith for steering the boat without the hydraulic device. Fig. 6 is a sectional elevation showing the arm for operating the valve of the hydraulic mechanism for steering the boat and also for starting or stopping the pony-pump at the same time.

Referring to the drawings, 1 represents the hydraulic cylinder, within which the piston-head 2 travels back and forth, being nicely fitted within it, in the usual way, with the ordinary packing-rings or packing, so as to fit and move as near water-tight as practicable. This cylinder 1 is preferably made of cast-iron, as being the cheapest and best material.

To the piston-head 2 is rigidly secured the hollow or partly hollow piston-rods 3, into which the flexible connection or cables 4 are secured in any well-known way. If desired, the piston-rods 3 may be made solid with an eye at the ends, and the chains or cables 4 secured thereto in any well-known or ordinary way.

The cylinder-heads 5 are secured to the cylinder by bolts 6, (see Fig. 1,) and to each head of the cylinder is secured by means of an elbow 7 a downwardly-projecting pipe 7^a, both vertical pipes being connected by elbows 8 with the horizontal pipes 8^a, to which the valve-case 9 is secured in the ordinary way.

The valve-case 9 (see Figs. 1, 2, and 3) is provided with two inlet-ports 10, which lead into the hydraulic cylinder 1. At the lower part of the valve is an exhaust-port 11, with which is connected the suction-pipe 12, (see Fig. 4, in which this suction-pipe is better shown,) and at the top of the valve is the outlet-port 13, with which the discharge-pipe 14 is connected. (Also shown in Fig. 4.)

The valve 15 is fitted within the valve-case substantially as shown in Figs. 1, 2, and 3, and is operated by the valve stem or shaft 16, which is rigidly secured to the valve and mounted in bearings in the case and protected from leakage by a stuffing-box 17. To the valve-stem 16 is rigidly attached an arm 18 for operating the valve 15. (See Fig. 1, also Figs. 4 and 6.) At the lower end of the operating-arm 18 is a downwardly-projecting portion 19, (see Fig. 6,) which projects down into an opening 20 through the bar 20^a. (See Fig. 4.) The opposite end of the bar 20^a is pivoted by a pin 21 to an arm 22, pivoted by a pin 23 to any suitable support. The opposite end of this arm 22 is pivoted by a pin 24 to rod 25, which is mounted in bearings so as to lie lengthwise of the cylinder and be moved longitudinally back and forth in its bearings.

To the rod 25 is rigidly fixed two arms 26 and 26^a. (Shown in Fig. 4.) The piston-rods 3 pass through the ends of the arms 26 and 26^a. At the ends of each of the piston-rods 3 is a flanged portion 27. The object of this construction is to provide the means for shutting off the steam, and consequently the action of the hydraulic cylinder, by turning the operating-arm 18 to its vertical or normal position whenever the piston 2 has reached the limit of its movement either way. For instance, if the operating-arm 18 is brought to the position shown in Fig. 6 by the dotted line 28 and the piston 2 in moving toward the limit of its movement, it will cause the end of the

arm 26ª, when the flange portion 27 reaches it, to move the rod 25, and through it the arm 22 and bar 20ª, which will bring the operating-arm 18 to its vertical position, and thereby shut off the action of the steam and water, and consequently the action of the device, and leaving the arm 18 in its normal position, or in the position to be again used when required for steering the boat in either direction. This action of the arm 18 also shuts the steam off from the pony-pump 29 (see Figs. 4 and 6) by means of a short arm 30, rigidly connected to the valve-shaft 16 and jointed by a pin 31 to a connecting-rod 32, which is jointed by a pin 33 to an arm 34, which opens and closes the valve 35 of the pony-pump 29. From this construction it will be seen that by moving the arm 18 either way the arm 30 will also move and operate the valve as above mentioned, so that both the hydraulic valve and the steam-valve are operated at the same time.

The tiller-arm 36 is operated by means of a sleeve 37, adapted to slide freely along the arm. To this sleeve is connected a chain or cable 38, which passes therefrom over friction-rollers 39 39ª, and from thence to and over friction-rollers 40 40ª, and from thence to the usual winding-drum 41, where it is connected so that by turning the drum-wheel *f* either way the rudder can be operated in the usual way.

My improved steering device is also combined with the tiller-arm, being connected therewith by the chains or cables 4, which pass from the piston-rods 3 to and over the friction-rollers 43 43ª, and from thence back to and over the friction-pulleys 42 42ª, and from thence to a quadrant 44, which is rigidly secured to the tiller-post 45 by means of the straps 46 46ª and the bolts 47. (See Fig. 4.) The cables 4 are attached each to the side corners 46ᵇ of the quadrant, so that as the piston-rods 3 are moved back and forth in the hydraulic cylinder the rudder may be turned either way, the movements being about forty-five degrees, more or less. Connecting with the pipe 7ª is arranged a relief-pipe 48, having a shut-off valve 49. (See Fig. 1.) Should the pump 29 become disabled or the mechanism connected with its steering-gear require repairs, the relief-valve 49 could be opened and the water or other liquid would be allowed to pass freely from one side of the follower to the other through the relief-pipe. In this case the boat can be steered by the usual steering-drum wheel *f*, its cables, and connecting parts, which are combined with and form part of the steering device, so that either one or both operate together.

In operation, when it is desired to steer a boat equipped with my improvement, the operator has simply to turn the arm 18 in the required direction, thus opening the valve 35 and admitting steam to the pump 29, which draws the water from one side of the piston 2 in the cylinder 1 and forces it into the opposite side, and by reversing the movement of the arm 18 the action of the water is reversed. The operation of the valve will be plainly understood from the drawings. By this construction the use of a pressure-tank is avoided, and the same water is continually used by being forced in at one end of the cylinder at the same time it is drawn from the other end, the same being alternately forced and drawn from opposite ends of the cylinder by the action of the pony-pump.

By connecting the steering-wheel and its cables connected with tiller-bar with the hydraulic steering apparatus, so that either can be used at will, either one can be used when the other is disabled, which is a very important advantage.

I claim as my invention—

1. A steering-gear for floating vessels, consisting in the combination of a hydraulic cylinder provided with a piston-head having piston-rods projecting from both sides and passing through the cylinder-heads, cables connecting with the ends of the piston-rods and passing over friction-rollers to and connecting with the tiller-arm, a steam-pump for forcing water to the hydraulic cylinder and connected thereto by a discharge and suction pipe, an operating-arm connected to the valve-stem of the hydraulic cylinder for controlling the action of the same so as to move the hydraulic piston in either direction, and an arm connected with the operating-arm so as to be operated thereby and connected with the steam-valve for admitting or shutting off steam from the steam-pump and thereby controlling its action at the same time, substantially as described.

2. A steering-gear for floating vessels, consisting in the combination of a hydraulic cylinder provided with a piston having piston-rods projecting from both sides and passing through the cylinder-heads, cables connecting with the ends of the piston-rods and passing over friction-rollers to and connecting with the tiller-arm, a steam-pump for forcing water to the hydraulic cylinder and connected thereto by a discharge and suction pipe, an operating-arm connected to the valve-stem of the hydraulic cylinder, having a lower portion projecting into a slotted bar having its opposite end pivoted to a pivoted arm, a rod mounted in bearings in the cylinder-heads so as to move back and forth lengthwise of the cylinder, and provided with arms 26 26ª, flanged portions 27 on the piston-rods, and an arm connected with the operating-arm so as to be operated thereby, connecting by a connecting-rod with the valve for admitting or shutting off steam from the steam-pump, whereby the steam is automatically shut off and the action of the device stopped when the hydraulic piston has reached the limit of its movement either way, substantially as described.

3. In a steering apparatus, the combination of a double-acting hydraulic cylinder, pipes

connected with opposite ends of the cylinder, a valve connecting with ports leading to opposite ends of the same, and a pony-pump connected by a discharge and suction pipe with the valve for alternately supplying and drawing the water from opposite ends of the cylinder, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DAVID WELCH.

Witnesses:
OTTO HODDICK,
ERNEST L. PARRISH.