(No Model.) 2 Sheets—Sheet 1.

J. B. PURVIS.

STEERING APPARATUS.

No. 439,763. Patented Nov. 4, 1890.

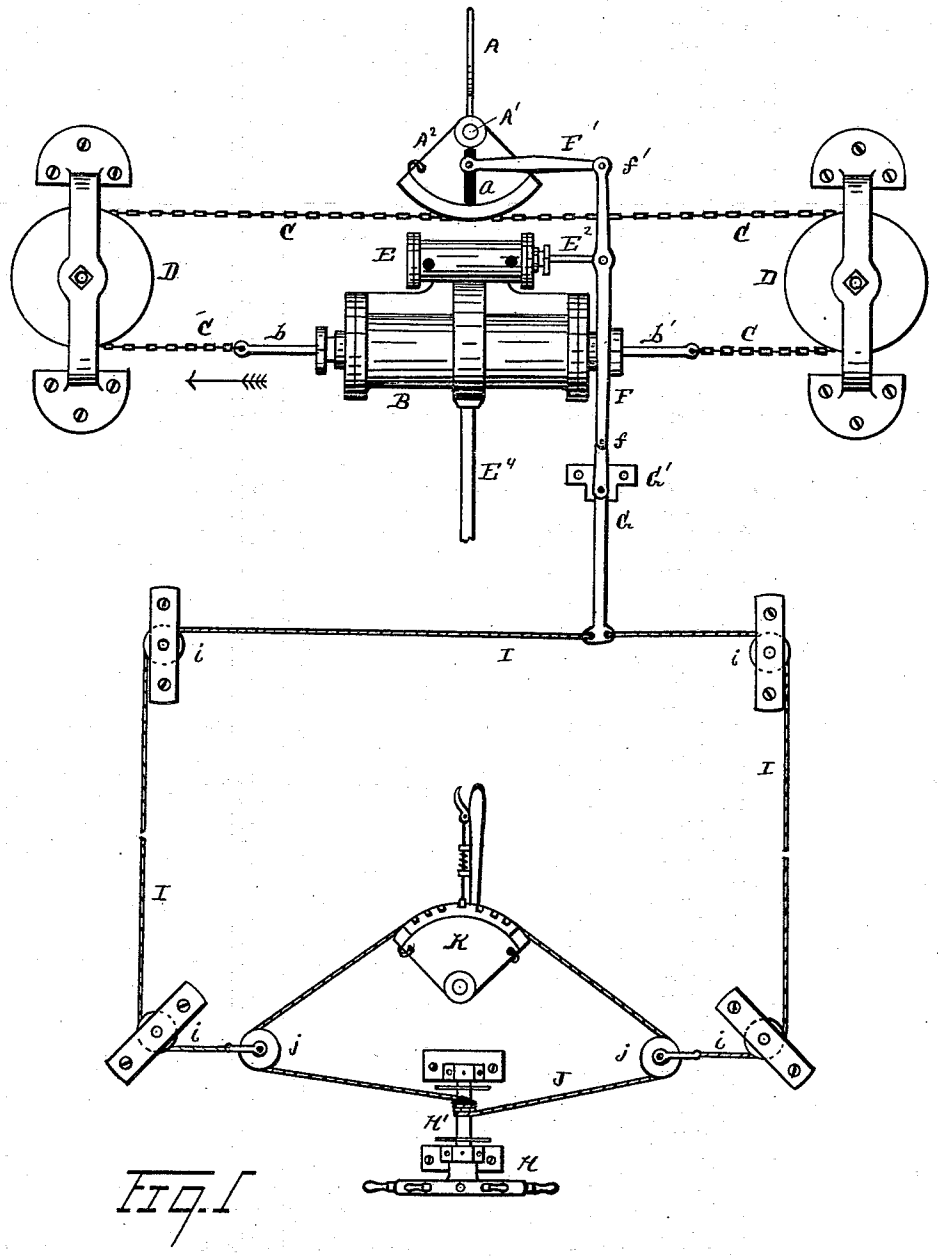


FIG. 1

Witnesses
John Schuman.
Charles F. Salow.

Inventor
John B. Purvis
By his Attorney
Newell S. Wright.

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

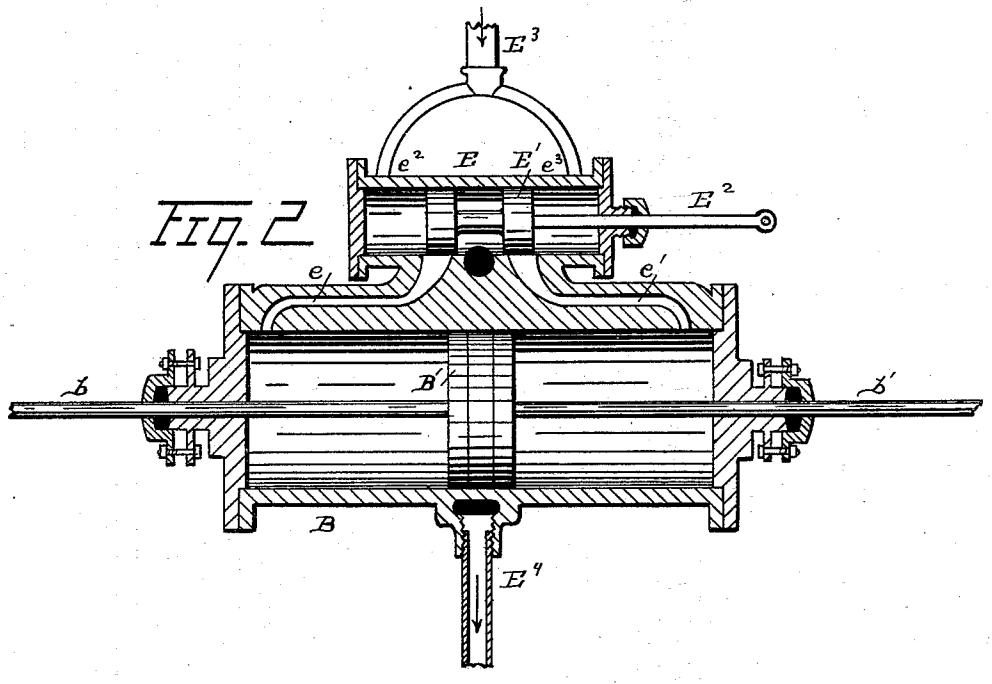
(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN B. PURVIS, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-THIRD TO S. O. BROOKS, OF SAME PLACE.

STEERING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 439,763, dated November 4, 1890.

Application filed July 24, 1889. Serial No. 318,504. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. PURVIS, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in a Steering Apparatus; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object to provide an improved steering apparatus adapted for either steam or hydraulic power, which shall be simple in construction and operation, and in which the liabilities of getting out of order heretofore existing in devices of this class shall be overcome.

To this end my invention consists of the devices and appliances, their combinations and arrangements, as more fully hereinafter described, and pointed out in the claims, and more fully illustrated in the accompanying drawings, in which—

Figure 1 is a diagram plan illustrating my invention. Fig. 2 is a horizontal section through the power-cylinder and valve-chest, showing the valve in position to equalize the pressure on the piston.

I carry out my invention as follows: A represents the rudder; A′, the rudder-stock; and A^2 is a quadrant engaged thereupon. The stock may be extended through and above the quadrant in order that any ordinary hand apparatus may be attached thereto.

B represents a power-cylinder provided with a piston B′, having piston-rods *b b′* extending in opposite directions through the opposite ends of the cylinder.

C denotes a cable engaged with the quadrant and with each of the piston-rods, as shown. The cable may be passed about any suitable arrangement of pulleys D. The engagement of the cable with the quadrant and with the two piston-rods is such that when the piston is moved in one direction the quadrant, and consequently the rudder, will be moved in an opposite direction.

E is a valve-chest communicating with the power-cylinder through posts *e e′*.

E′ is a balanced valve to control admission to said cylinder, said valve provided with a valve-rod E^2 extending through the valve-chest.

E^3 is a power-supply pipe, which may enter the valve-chest at either end, as shown at e^2 e^3.

E^4 is an exhaust-pipe.

I would have it definitely understood that I do not limit myself to any particular valve mechanism for controlling admission of power to the power-cylinder.

F is a lever for operating the valve, and which may have any suitable connection with the valve-rod.

G is an arm having a jointed engagement with one end of said lever, as shown at *f*, whereby said lever may be operated from the wheel or analogous steering device to throw the valve, as may be desired. The arm G may be fulcrumed in any suitable support or hanger G′. At the opposite end the lever F is engaged with the quadrant A^2 by means of a connecting-arm F′, having a jointed engagement therewith, as at *f′*.

I prefer that the connecting-arm shall have an adjustable engagement with the quadrant, and for this purpose the quadrant may be constructed with an elongated slot *a*, in which the adjacent end of the connecting-arm may be secured either nearer to or farther from the rudder-stock, as may be preferred. The lever F, as thus engaged with the valve, the operating-arm G, and the quadrant A^2, affords a differential movement to the valve, and which may be regulated, as required, by the adjustment of the connecting-arm F′ in the quadrant A^2.

When the rudder is amidships, the valve is in its normal position to slightly open both the ports to the cylinder B, so that the pressure will be equalized on both sides of the piston. The valve will thus be in position so that a slight movement in the required direction will close one of the ports and open the other. We will suppose that the valve is thrown to move the piston in the direction of the arrow. The piston-rod *b′* will then be moved

inward, drawing the cable therewith and moving the quadrant A^2 in the direction opposite to that indicated by said arrow. In this case the arm G is moved to throw the adjacent end of the lever F in the direction of the arrow. In the operation of the lever F by the arm G the point f' is the fulcrum. Now, in consequence of the movement of the quadrant, as above explained, it is evident that a differential movement is given to the valve, since the movement of the quadrant, as explained, will force the adjacent end of the lever F therewith, the point f being the fulcrum in this latter movement of said lever, and in consequence of which the valve will be restored to its normal position, equalizing the pressure upon the piston, and consequently the rudder will be firmly held in position until the valve is again operated, as desired. This restoration of the valve to its normal position in consequence of this differential movement will thus take place every time the valve is operated in either direction by the steersman. The nearer the connecting-arm F′ is adjusted to the rudder-stock the more the piston will travel before the valve will be restored to normal position, as it is evident that the adjacent end of the lever will in that case be moved a less distance than if the connecting-arm were adjusted farther away from the rudder-stock.

To operate the valve from the steering-wheel or analogous apparatus H, cables I are connected with the arm G, and also connected with said steering device or wheel in any suitable manner. As shown in the drawings submitted herewith, a steering-wheel H is engaged with a winding-drum H′.

J is a cable properly engaged with said drum and with a reversing-lever K, suitable movable pulleys j being provided for the training of said cable. The cable I is engaged with said pulleys j. Fixed pulleys i are provided for the traveling of said cable I. In this manner the arm G may be very readily operated. I do not, however, limit myself to any precise manner of connecting the steering-wheel with said arm.

In an arrangement like that shown it is evident that the wheel H and lever K may have different locations, and that one or more steering devices H or K of any desired construction may be located wherever desired to connect with and operate the cable I.

A very important feature of my invention consists in the fact that the cylinder B with the cable C and immediately-related parts may be located in the stern of the boat and adjacent to the rudder, while the cable I and its operating mechanism may be led forward, wherever desired.

It is evident that but little power is required to operate the valve from the wheel, and that in consequence the line or cable I may be small and inexpensive, as there is but little strain thereupon. The principal strain comes on the cable C, which may be of required strength. Heretofore in devices in common use it has been customary and necessary to lead the cable connected with the rudder up forward to the wheel, in consequence of which there has been great noise from the rattling of the heavy cable in the operation of the wheel, and moreover there has also been great liability of breaking the cable and thus rendering the rudder unmanageable. On account of the long distance from the rudder to the wheel it has been impracticable and expensive to provide a cable of sufficient strength to overcome this liability of breakage. Furthermore, in ordinary steam steering devices it has been impossible for the steersman to know what power he is putting on the cable, and the cable itself may get foul running so long a distance, and possibly impeded in its action by the location of the freight and from other causes, so that as a practical fact great harm is liable to result from the breaking of the cable, as is not infrequently the case; but in my invention the cable C is only a short cable, and being located near the rudder is more out of the way, for which reasons it is not liable to be fouled, and may be made so heavy without any considerable expense as to overcome all liability of breakage. When hydraulic power is employed, the cylinder B can be made of small size, and therefore without large expense. When hydraulic power is employed, the supply-pipe leading to the valve-chest, it will be understood, leads to a suitable pump. The pump should be so constructed and arranged that when a desired degree of pressure is reached a valve will close and stop the pump.

I would have it understood that I do not limit myself to the use of a quadrant engaged with the rudder-stock, as an ordinary tiller might be used instead.

What I claim as my invention is—

1. In a steering apparatus, the combination of the rudder, the power-cylinder provided with a piston, a cable connecting said piston with the rudder, a valve to control admission of power to said cylinder, a valve-operating device, and a connection between the valve-operating device, valve, and the rudder whereby the movement of the rudder operates said valve to cut off the power to said cylinder, said valve, cylinder, and cable located near the rudder, and said valve-operating device located forward, as desired, the connection leading from the rudder and valve extended forward to the valve-operating device, substantially as set forth.

2. In a steering-apparatus, the combination, with the rudder, of a power-cylinder, a piston located therein connected with the rudder, a valve to control the admission of power to said cylinder, a lever connected with said rudder and valve, a valve-operating device, and a cable-connection of said valve-operating device with said lever, substantially as described.

3. In a steering apparatus, the combina-

tion, with the rudder, of a power-cylinder provided with a piston connected in opposite directions with the rudder, a valve to control admission of the power-supply to said cylinder, a steering device to operate said valve, said valve having connection with said steering device, and an adjustable connection with said rudder, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

JOHN B. PURVIS.

Witnesses:
N. S. WRIGHT,
CHAS. F. SALOW.