No. 815,266. PATENTED MAR. 13, 1906.

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HYDRAULIC AND HAND STEERING GEAR.

APPLICATION FILED DEC. 4, 1902.

Fig. 1.

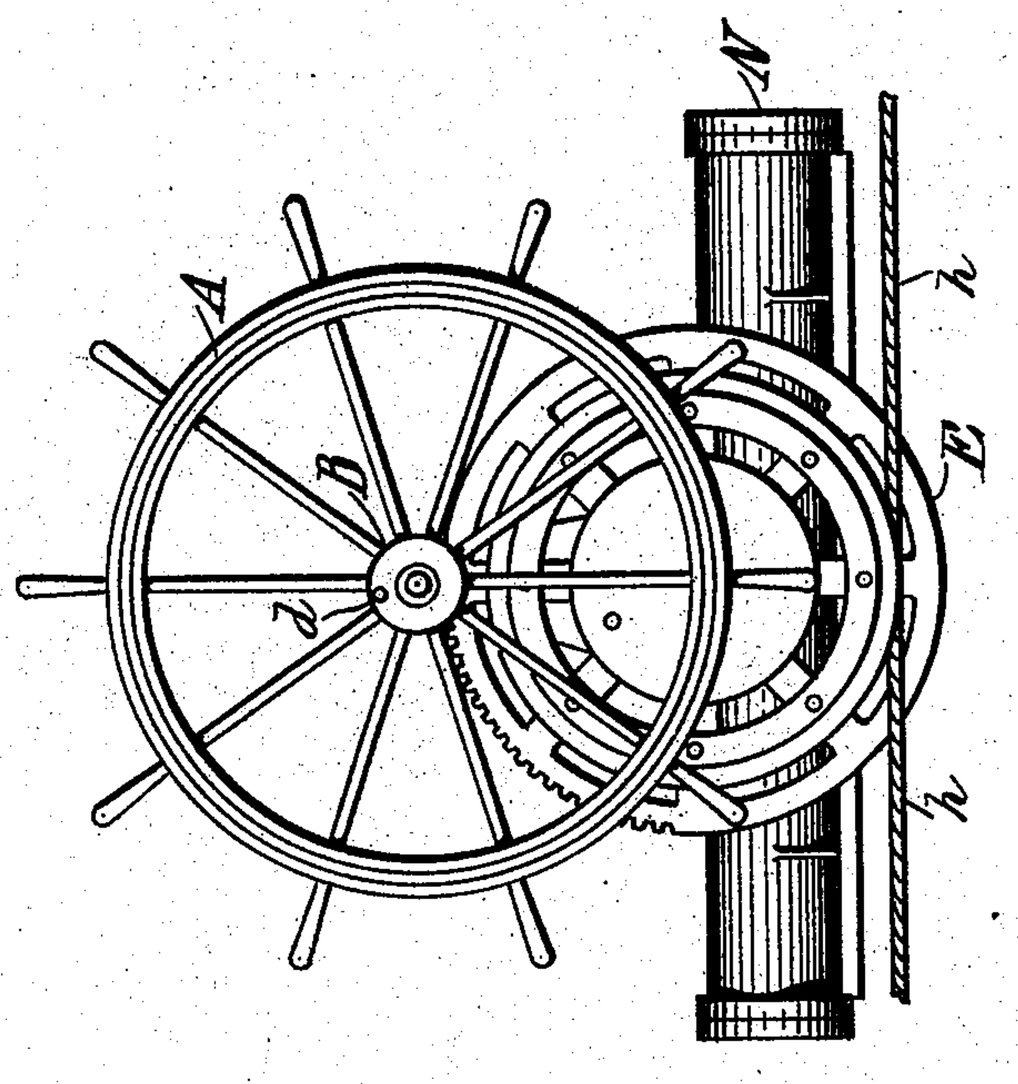


Fig. 3.

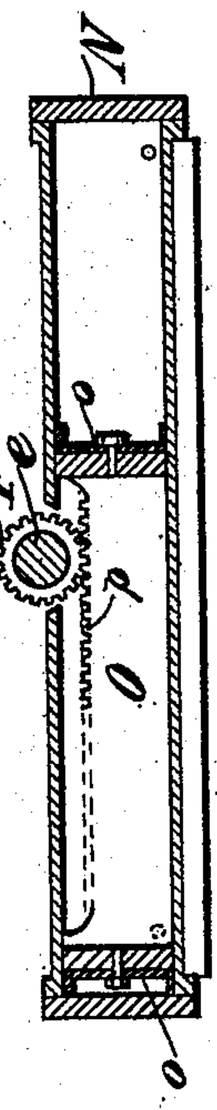
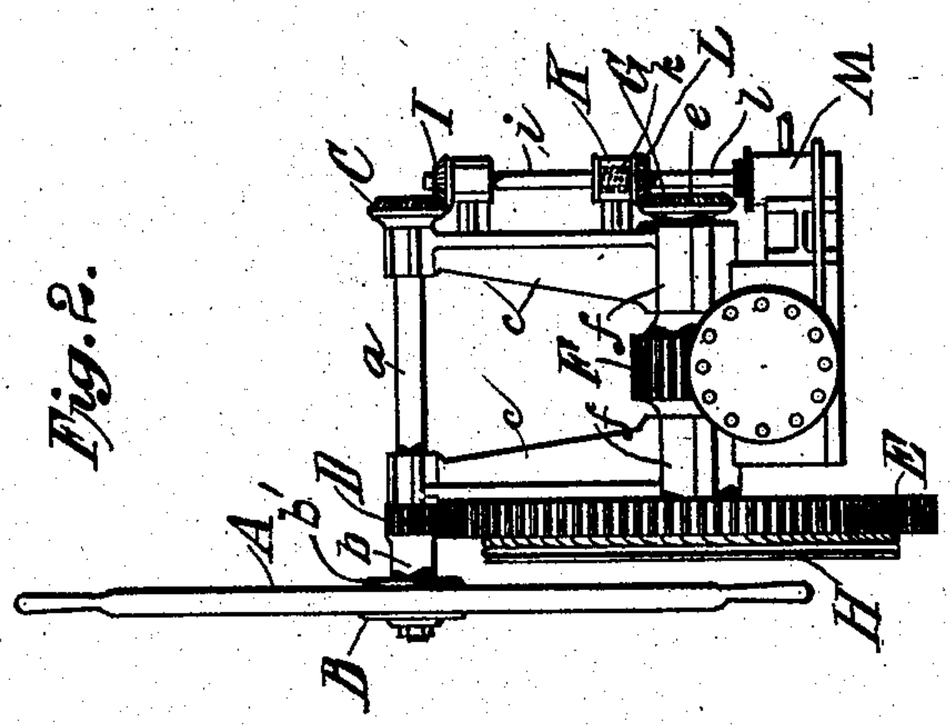


Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

JAMES G. COOPER, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, OF THREE-FIFTHS TO MARY BUDD, OF NEW YORK, N. Y.; HENRY D. COOPER ADMINISTRATOR OF SAID JAMES G. COOPER, DECEASED.

HYDRAULIC AND HAND STEERING-GEAR.

No. 815,266. Specification of Letters Patent. Patented March 13, 1906.

Application filed December 4, 1902. Serial No. 133,853.

To all whom it may concern:

Be it known that I, JAMES G. COOPER, a citizen of the United States, and a resident of Brooklyn borough, New York city, and State of New York, have invented certain new and useful Improvements in Hydraulic and Hand Steering-Gear, of which the following is a specification.

My invention relates to that class of steering apparatus in which the steering is effected by the application of mechanical power, and is more particularly intended for use on steam-yachts, torpedo-boats, tugs, and other vessels in which space has to be economized.

To that end I have devised a steering-gear especially adapted to be located in the wheel-house and capable of being operated by oil, water, or other liquid and also, when occasion requires, by hand.

To this end my invention consists, primarily, in a hydraulic cylinder adapted to be located in the wheel-house of a vessel, the supply-valve of which cylinder is operated by the turning of the wheel, mechanism operated by such cylinder whereby motion is communicated to the rudder or other steering device in either direction for each movement of the valve, and mechanism whereby the valve is immediately and automatically returned to its initial position after each movement.

One form of my invention is shown in the accompanying drawings, in which—

Figure 1 is a front elevation. Fig. 2 is a side elevation. Fig. 3 is a vertical longitudinal section of the cylinder.

Same letters indicate similar parts in the different figures.

A is the wheel, loosely mounted upon the shaft *a* by the sleeve *b*. This shaft is journaled in suitable posts or standards *c c* and at its forward end carries a perforated plate B, while at the rear end it has a beveled gear C. When a pin is inserted in the perforation *d* of the plate B, it engages with the wheel A, and thereby keys it to the shaft *a*, and therefore turning the wheel turns the shaft. Loosely mounted upon the shaft *a* is a sleeve *b*, having a plate *b'* in juxtaposition to the wheel A and also having a cog wheel or pinion D. Said plate *b'* may have a perforation corresponding to that shown at *d*, adapted to receive a pin to connect it with the wheel A, or other equivalent means for such purpose may be provided. When the pin is removed from perforation *d* and inserted in the perforation in plate *b'*, the turning of the wheel A only turns the sleeve *b*, on the end of which is mounted the cog-wheel D. This cog-wheel D meshes with the large gear E, which is loosely mounted on the shaft *e*. Said shaft *e* is journaled in suitable boxes *f f* and carries a cog-wheel, the purpose whereof will be hereinafter explained. It also carries at its rear end a beveled gear G. To the face of the gear E is bolted a sheave H, around which is coiled the rope *h*, which leads to the rudder or other steering device. The sheave H is made removable from the gear-wheel E, so that sheaves of different sizes may be substituted. This is to accommodate rudders of different swing and enables me to apply my improved steering-gear to all sorts of vessels instead of requiring the steering-gear to be specially built for the particular vessel, as would be the case if the sheave were unchangeable. The motion of the sheave in either direction must correspond to the half-swing of the rudder in that direction.

When the rudder is to be moved by hand in the usual way without the aid of my hydraulic steering-gear, the only active part of the apparatus consists of the wheel A, sleeve *b*, cog D, large gear E, and sheave H.

When the hydraulic motor is to be employed, it is brought into action as follows: The pin is removed from the perforation in plate *b'* and is inserted through the perforation *d*, and the shaft *a* is ready for action. The gear E is now keyed to the shaft *e* in any suitable manner. Splined to the vertical shaft *i*, journaled in brackets projecting from the rear standard *c*, is a beveled gear I, which engages the beveled gear C on the shaft *a*. The lower end of the shaft *i* is screw-threaded through the box K, which may be secured to one of the brackets before mentioned into the threaded sleeve *k* of the beveled gear L. The beveled gear L is loosely mounted on the end of the valve-stem *l* of a valve (not shown) located inside the valve-box M, said valve-stem being a continuation of shaft *i*. The valve is of ordinary construction, being adapted to receive oil or other liquid from a pressure-reservoir (not shown)

and deliver it to either end of the hydraulic cylinder N, as may be required.

Inside the cylinder N is a double-headed piston O, each head being provided with the usual leather cup *o*. As is well known, the admission of oil, water, or other liquid under pressure to one end of the cylinder accompanied by withdrawal of the pressure from the other end forces the piston in one direction, while the reverse action forces it in the other direction. The piston carries a rack *p*, the teeth of which mesh with the gear F, before mentioned as mounted on the shaft *e*. The turning of this gear F and shaft *e* rotates the large gear E and moves the rudder in one direction or the other, according to the slide of the piston O.

In an apparatus of this character it is desirable that the rudder should not be allowed to turn too far when an impulse is received from the motor-cylinder. To guard against this, I have devised a means of utilizing the motion of the gear F to restore the operating-valve to its initial position immediately upon the receipt of an impulse by the piston. In other words, when the valve in the valve-box M is reciprocated to admit oil or other fluid to the cylinder on either side of the piston instead of waiting for the man at the wheel to turn the valve off and stop the motion of the piston I cause the motion of the piston itself to throw the valve back and cut off the impulse. Length of the slide allowed to the piston before this cut-off takes place may be graduated by the number of teeth of the beveled gear G; but ordinarily it is best to have the slide of the piston correspond to such motion of the rudder as would turn the prow a point or a half-point only to port or starboard. The man at the wheel will know, therefore, that he must give as many impulses to the wheel A as he desires to turn the vessel points or half-points in a given direction.

It is obvious that by reason of the slip connection rendered possible by the screw-threads in the box K the turning of the splined shaft *i* by the shaft *a* does not rotate the beveled gear G, while the rotation of the beveled gear G simply lifts the splined shaft without rotating it.

I claim—

A hydraulic and hand steering-gear, which consists of a steering-wheel, a hydraulic cylinder adapted to be located in the wheel-house of the vessel, a sliding piston in said cylinder, mechanism, whereby the supply-valve of said cylinder may be operated by the turning of the wheel, a slip connection in said mechanism whereby the same can be turned without operating said valve, and mechanism operated by said piston whereby motion is communicated to the rudder and the valve simultaneously returned to its initial position after each movement.

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Witnesses:
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