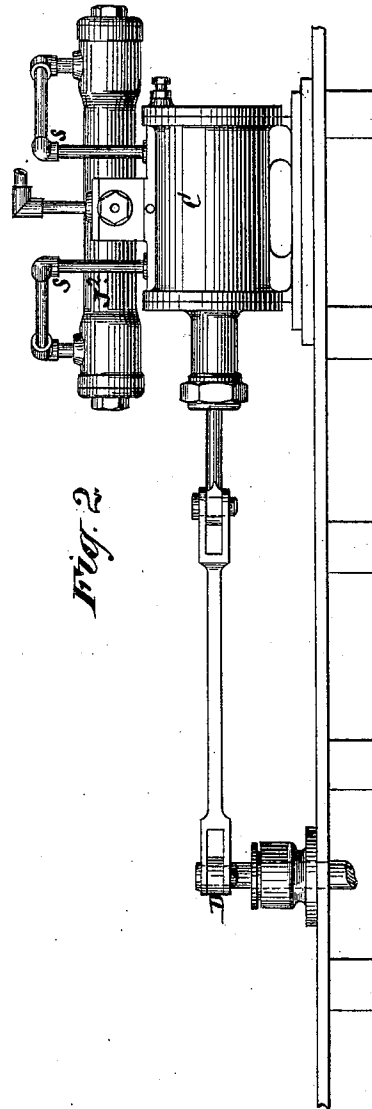
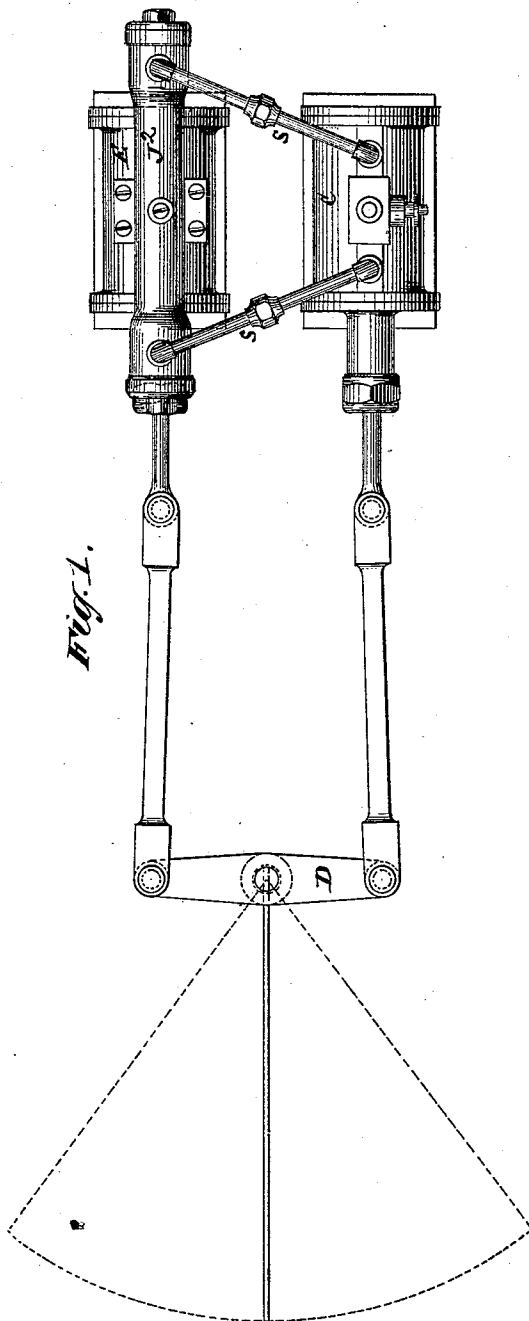


G. H. REYNOLDS.
STEAM STEERING APPARATUS.

No. 250,103.

Patented Nov. 29, 1881.



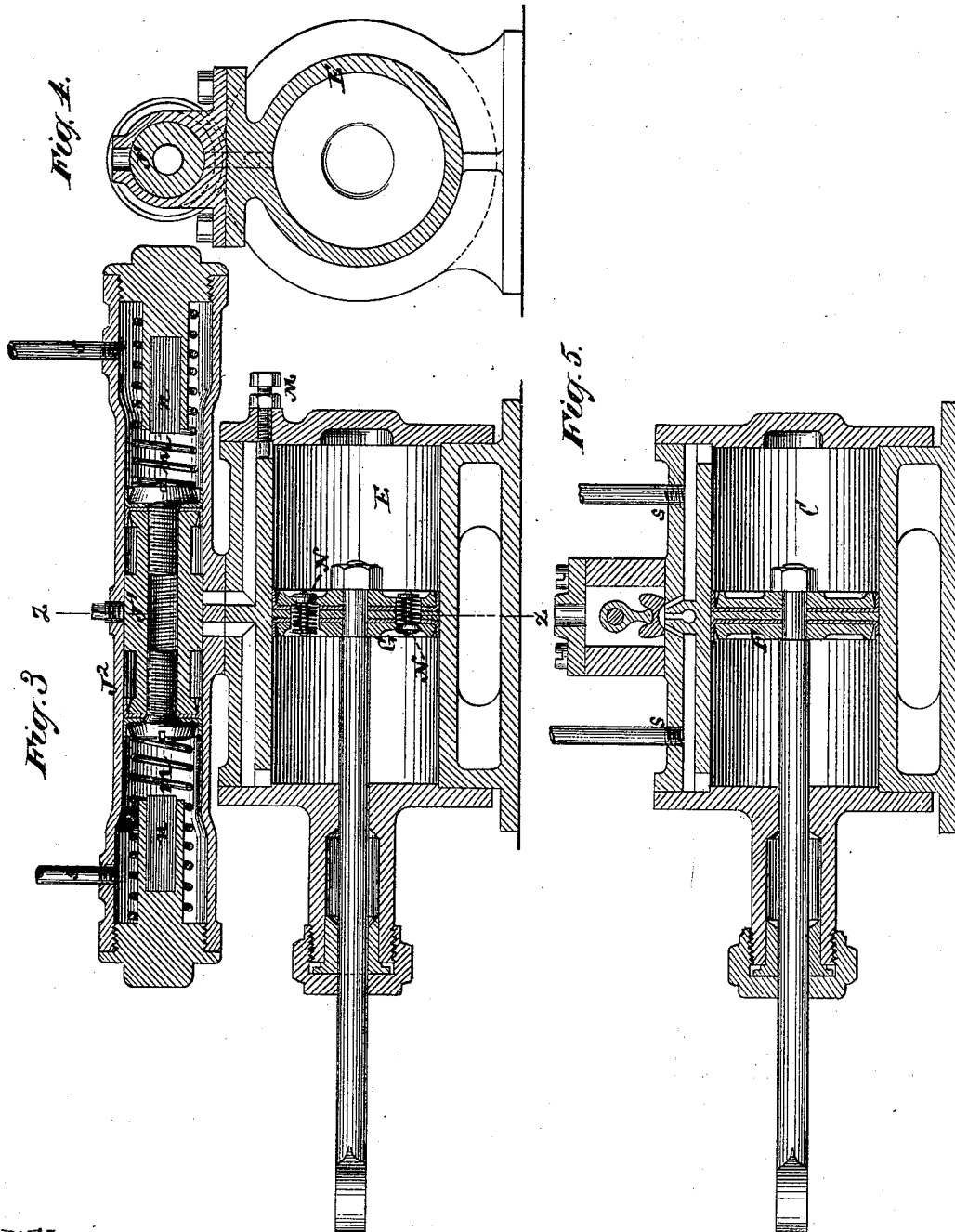
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UNITED STATES PATENT OFFICE.

GEORGE H. REYNOLDS, OF NEW YORK, N. Y.

STEAM STEERING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 250,103, dated November 29, 1881.

Application filed March 26, 1879.

To all whom it may concern:

Be it known that I, GEORGE H. REYNOLDS, of the city and State of New York, have invented certain new and useful Improvements in Steering Apparatus, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to steering apparatus, in which is combined with a rudder a steering-cylinder and piston adapted to be worked by steam, gas, or other fluid, and a locking or controlling cylinder filled with water or other liquid, whereby provision is afforded for holding the rudder stationary in any position in which it may be placed until it is desired to change its position. Such locking or controlling cylinder is fitted with a valve, whereby communication from one end of it to the other is afforded to permit of circulation of the liquid at the time of moving the rudder; and the object of my invention is to produce the operation of said valve automatically by the act of admitting steam, air, or other motive agent to the steering or working cylinder. An apparatus in which this object is attained, though applicable for vessels generally, is specially useful, and indeed almost necessary, for submarine torpedoes or other submarine vessels which are controlled by electricity from the shore or distant point, and it is very desirable in any steering apparatus operated directly by steam.

The invention consists in the combination, with a rudder, of a steering or working cylinder and piston and a locking or controlling cylinder, both connected therewith, a valve for controlling the passage of liquid from one end to the other of said locking or controlling cylinder, and a valve for admitting steam or other motive agent to the steering or working cylinder, and at the same time admitting steam or other motive agent to act upon the valve of the locking or controlling cylinder. The two cylinders are preferably arranged side by side, and have their pistons connected with opposite ends of a lever fixed upon the rudder-post, and the simultaneous admission of steam or other motive agent to the steering or working cylinder and to the valve of the locking or controlling cylinder is provided for by pipes extending from the two supply ports or pas-

sages of the steering or working cylinder to opposite ends of the chest in which works the valve of the locking or controlling cylinder. 55

The invention also consists in the combination, with a steering or working cylinder, a locking or controlling cylinder and a valve for establishing communication by a passage between the two ends of said locking-cylinder, of a throttling device independent of said valve, and preferably consisting of a screw which may be adjusted independently of the movement of said valve to more or less close the passage through which liquid circulates from end to end of said locking or controlling cylinder. 65

The invention also consists in a novel arrangement of relief-valves, which, when the rudder is struck by a heavy sea, will open to effect communication between the two ends of the locking or controlling cylinder, and thus prevent breakage of the parts of the apparatus. 70

In the accompanying drawings, Figures 1 and 2 represent a plan and elevation, respectively, of an apparatus embodying my invention. Fig. 3 represents a longitudinal section upon a larger scale of the locking or controlling cylinder and piston; Fig. 4, a transverse section thereof upon the dotted line X X Fig. 3; and Fig. 5 represent a longitudinal section of the steering or working cylinder and piston on the same scale as Figs. 3 and 4. 80

Similar letters of reference designate corresponding parts in all the figures. 85

C is the steering-cylinder, which may be a compressed-air or gas one, and the piston of which, by means of suitable connections, takes direct hold of the tiller D. Said tiller is represented as formed of a double-armed lever or yoke, and the piston F of the working or steering cylinder C takes hold of one end of it, while its opposite end is attached to the piston G of the controlling and locking cylinder E, which is charged with an incompressible liquid, as before. Supposing compressed air or gas to be admitted to either one end of the cylinder C, according to the position of the valve which controls the motion of the piston in said cylinder, it immediately acts upon the said piston, and through one or other of two pipes, s s, connected with the cylinder C, upon a piston-valve, J', applied to the liquid-cylinder E and working in a valve-case, J². This valve 100

J' is held in a central position, closing the ports of the cylinder E by reason of its being exposed to an equilibrium of pressure at its ends, and by springs *m m*, applied to the latter. When said valve is in this position the piston G is locked from movement in either direction by reason of the incompressible liquid in the cylinder E, and the steering-piston F of the steering-cylinder also locked by reason of its connection with the piston G; but when the gas or compressed air is brought to bear upon either end of the valve J' it moves said valve to open the port from one end to the other of the liquid-cylinder E, so that the liquid therein is readily put in motion as the piston advances. This action continues until the rudder has been moved to the required position, when the gas or air is exhausted and the valve J' returns to its normal position and locks the rudder again.

To prevent any slamming of the valve J', buffers *n n* may be used in concert with the springs *m m*, to arrest the motion of the valve.

It will be observed that the passage between the ends of the controlling and locking cylinder is always closed when the steam, gas, or other motive agent is shut off from the working or steering cylinder, and is always open when the motive agent is admitted to either end of the steering-cylinder.

A regulating-screw, M, or other throttling device (see more particularly Fig. 3) may be applied to the passage which connects the ends of the liquid-cylinder E to more or less throttle said passage, and so to give any desired speed or freedom to the flow of the liquid through said passage when the valve controlling it is open. This device is applicable to the controlling and locking cylinder whether its valve be automatically thrown or mechanically moved, as also is another device shown in Fig. 3, and which consists in one or more relief-valves, N, applied to the liquid-cylinder E or its piston G, and closing, by means of spring-pressure, against passing the liquid in said cylinder to opposite sides of said piston under all ordinary strains upon the rudder, but which valves will give way or open when the rudder is struck by a heavy sea, and so prevent breakage of the steering devices. These relief-valves are here shown as arranged in the piston G; but they might be arranged in the passage which connects the opposite ends of the liquid-cylinder.

I claim—

1. The combination, with a rudder, of a steering or working cylinder and piston and a locking or controlling cylinder and piston, both connected therewith, a valve for controlling the passage of liquid from one end to the other of said locking or controlling cylinder, and a valve for admitting steam or other motive agent to the steering or working cylinder, and at the same time admitting steam or other motive agent to act upon the valve of the locking or controlling cylinder, substantially as specified.

2. The combination, with a rudder, of a steering or working cylinder and piston and a locking or controlling cylinder and piston, both connected therewith, a valve and chest for controlling the passage of liquid from one end to the other of said locking or controlling cylinder, a valve for admitting steam or other motive agent to the said steering or working cylinder, and pipes for conducting steam or other motive agent from the supply-passages of said steering or working cylinder to act upon the valve of the locking or controlling cylinder, substantially as specified.

3. The combination, with the rudder and the tiller or lever D, of the steering or working cylinder C and the locking or controlling cylinder E, arranged side by side, and both connected with said tiller or lever, and the pipes *s s*, substantially as specified.

4. The combination, with the steering or working cylinder, the locking or controlling cylinder provided with a passage connecting its opposite ends, and a valve for controlling said passage, of a throttling device independent of, and adapted to be adjusted independently of, said valve to more or less close said passage, substantially as specified.

5. The combination, with a steering or working cylinder and a locking or controlling cylinder, of a valve controlling the passage of liquid from end to end of said locking or controlling cylinder and spring-actuated relief-valves for establishing communication in the locking or controlling cylinder between opposite sides of its piston, substantially as and for the purpose specified.

GEO. H. REYNOLDS.

Witnesses:

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