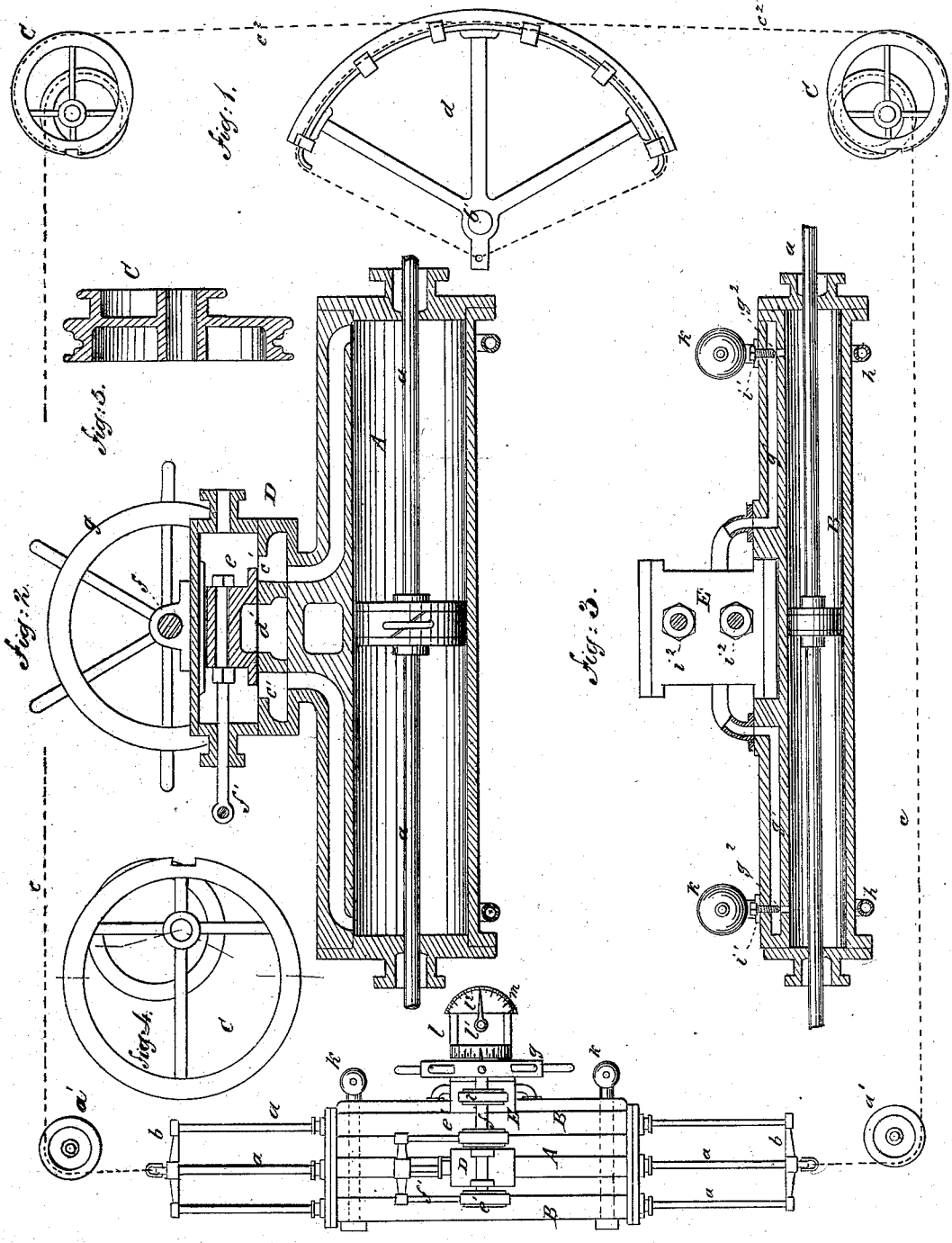
(No Model.) 2 Sheets—Sheet 1.

J. F. GUILD & A. E. KNIGHTS.

Steam Steering Apparatus.

No. 242,634. **Patented June 7, 1881.**



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

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Fig: 6.

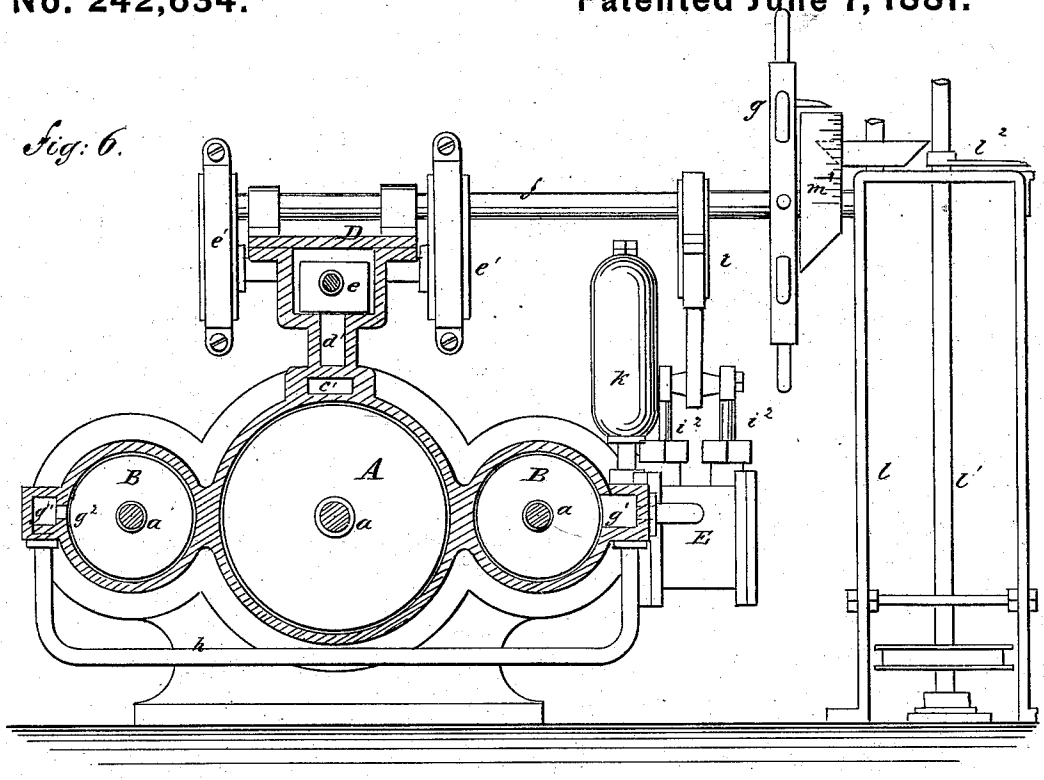


Fig: 7.

Fig: 8.

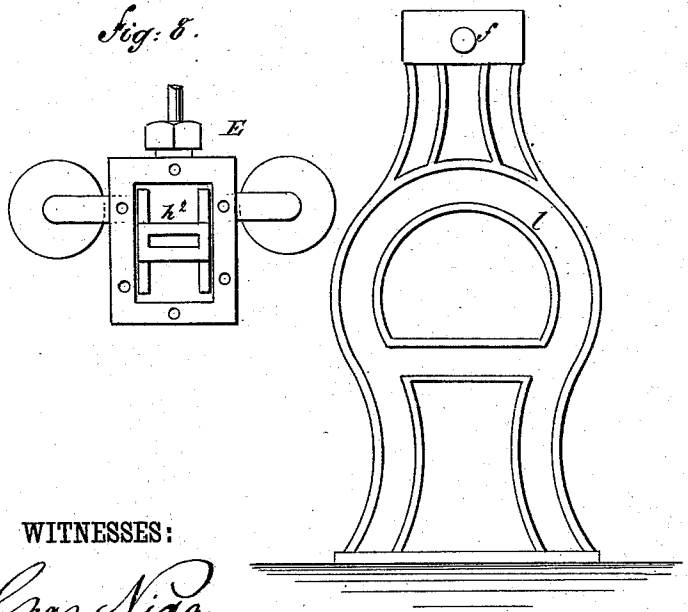
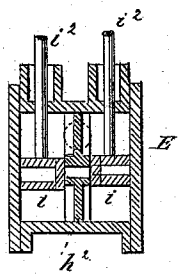


Fig: 9.



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UNITED STATES PATENT OFFICE.

JAMES F. GUILD, OF DUNDEE, COUNTY OF FORFAR, SCOTLAND, AND ARTHUR E. KNIGHTS, OF NEW YORK, N. Y.

STEAM STEERING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 242,634, dated June 7, 1881.

Application filed September 28, 1880. (No model.)

To all whom it may concern:

Be it known that we, JAMES FINDLAY GUILD, of Dundee, county of Forfar, Scotland, and ARTHUR EDWARD KNIGHTS, of the city, county, and State of New York, have invented a new and useful Improvement in Steam Steering Apparatus for Vessels, of which the following is a specification.

Our improvements relate to apparatus for steering vessels by steam and other power.

The objects of our invention are to move a vessel's rudder easily, quickly, and with perfect regularity, to have it completely under control and almost silent in its action, thus in a great measure overcoming objections to the usual steam steering apparatus, especially on passenger-steamers. The objects are, further, to provide for steering vessels either by hand or power; to provide for the relief of the operative mechanism from the injurious effects of shocks by strokes of waves against the rudder, and to reduce the power usually required in apparatus of this character.

Our invention consists of the steam-cylinder, the steam-chest having inlet-ports and containing a valve, the liquid-cylinders having passages, the valve-chamber provided with a partition and valves, and the pistons connected with the steering-chains, combined together and provided with a hand-wheel for giving simultaneous movement to the valves, and in the combination of the cross-shaft, the steering-wheel, and eccentrics with the steam-cylinder, the liquid-cylinders, and their valves, for the simultaneous operation of the valves. These features will be more particularly described hereinafter with reference to the accompanying drawings forming part of this specification, wherein—

Figure 1 is a plan view of steering apparatus embodying our improvements. Fig. 2 is a vertical longitudinal section of the steam-cylinder and valve. Fig. 3 is a horizontal section of one auxiliary cylinder or regulator. Fig. 4 is a plan view, and Fig. 5 a section, of the differential eccentric. Fig. 6 is a vertical cross-section of the steam and liquid cylinders. Fig. 7 is an end view of the wheel-standard. Figs. 8 and 9 are sectional front and side views of the regulator-valves.

Similar letters of reference indicate corresponding parts.

A is the steam-cylinder and B B the liquid-cylinders, placed on opposite sides of cylinder A. These cylinders have separate pistons, the rods *a* of which extend through the heads at both ends, and are connected by cross-heads *b*. The steering chains or ropes *c* are connected to heads *b* by shackles or eyes, and pass around fixed sheaves *a'* and along the deck to the eccentrics C, from which chains or ropes c^2 pass around a quadrant, *d*, that is fixed on the rudder-post *b'*, the ends of the chains or ropes being connected to the forearm of the rudder head or shaft, which may be extended to any desired height, as required.

D is the steam-chest containing slide-valve *e*, and provided with inlet-ports *c'* to the cylinder A and exhaust-port *d'*. Above the steam-chest, in suitable bearings, is a cross shaft, *f*, carrying the wheel *g*, and also carrying eccentrics *e'*, from which rods extend to a cross-head on the valve-rod *f'*, so that the valve is moved by operation of shaft *f*. The valve *e* is so formed and placed in relation to the ports that when it is at the middle position both ports *c'* are open for admission of steam and the exhaust closed, thereby giving equal pressure at both sides of the piston-head, while the movement of the valve in either direction from the center closes the port *c'* at that side to steam and opens it to the exhaust, thus relieving the pressure at one side.

The cylinders B are provided with passages *g'*. Both these cylinders are connected by a pipe, *h*, at each end, which connect the passages *g'*. The passages *g'* of one cylinder, B, communicate with a valve-chamber, E, containing valves *i*, by which passage of the fluid is permitted or stopped. At the ends of cylinder B are screw-taps *i'*, which extend into the openings or ports g^2 from passages *g'* to the interior of the cylinders, so that these openings can be closed more or less by turning screws *i'*, and the escape of fluid regulated. As shown in Fig. 6, the rods i^2 of valves *i* are connected to a cross-head, that is, in turn, connected to the rod of an eccentric, *r*, on shaft *f*, so that the valves are simultaneously operated with the steam-valve.

The chamber E is divided by a central partition, h^2, in which is a port for passage of the liquid from one passage, g', to the other. The valves i are fitted at opposite sides of partition h^2, so that they close the port when in their middle position and open it by movement in either direction. There being two valves, the pressure comes on them alternately at the back, thus keeping their faces pressed over the port.

The cylinders B will be preferably filled with oil. At k are reservoirs used for supplying the oil, and in which a supply is maintained to keep the passages full in case of accidental waste. The ports g' are placed a short distance from the ends of cylinders B, so that the piston-heads will be cushioned by the oil. The cylinder A may have spiral springs fitted to prevent undue strain on the heads by the piston through negligence.

The outer end of shaft f and wheel g are supported by a standard, l, which also carries a vertical shaft, l', that will be suitably connected with and moved by the rudder, to show by the pointer l^2, carried by shaft l', the angle of the rudder at all times on a fixed dial, m. The standard l also carries a ring-shaped index-plate, m', and mechanism to move the same for indicating the travel of the steam-valve. On the wheel g is a pointer, which shows on the plate m' the position of the steam and oil valves. The arrangement of the marks is thus: When the pointer on the wheel is at the word "port" it indicates that the steam-valve is at the extreme length of its travel, with the exhaust-port and oil-valve open to the port end of cylinder A, thus allowing escape of steam-pressure sufficient for the travel of the piston in that direction. When the pointer is at "steady port" it indicates that the valve is in position to entirely close the steam-port and oil-passages, thus entirely locking the apparatus at any point in the movement. The same applies in the opposite or starboard direction. When the pointer is at a mark "steady" it will indicate that the oil-ports are open and the steam-valve in the middle position, so that steam is admitted equally on both sides of the piston-head, with the rudder in the fore and aft or central position. The oil-valves i being moved at the same time, the oil passes from one side of the piston-heads to the other. To lock the wheel it is only necessary to return the valve to the central position by turning the wheel, and the oil-valve being thereby moved to close the oil-port the rudder is locked. To return the rudder the wheel is to be turned in the opposite direction and held until the indicator shows the rudder to be in the position desired.

We do not limit ourselves to the use of a single steam-cylinder nor to any special number or arrangement of regulating-cylinders.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In apparatus for steering by steam or other power, the steam-cylinder A, steam-chest D, having ports e', and containing valve e, liquid-cylinders B, having passages g', chamber E, provided with partition h^2, and valves i and pistons a, connected with the steering-chains, combined together and provided with a hand-wheel for giving simultaneous movement to the valves, substantially as shown and described.

2. In a steering apparatus for vessels, the combination, with the steam-cylinder A, the liquid-cylinders B, and their valves, the shaft f, the eccentrics e e', connected to a cross-head on the valve rod f', the eccentric r, connected to the cross-head, of the valve-rods i^2 and the wheel g, substantially as herein shown and described, for the simultaneous operation of the valves.

The above specification of our invention signed by us the 9th day of August, 1880.

JAMES FINDLAY GUILD.
ARTHUR EDWARD KNIGHTS.

Witnesses:
C. W. GORDON,
J. J. BUCHHEISTER.