F. E. SICKELS.

Steam-Steering Apparatus for Vessels.

No. 196,709. Patented Oct. 30, 1877.

Fig. 1.

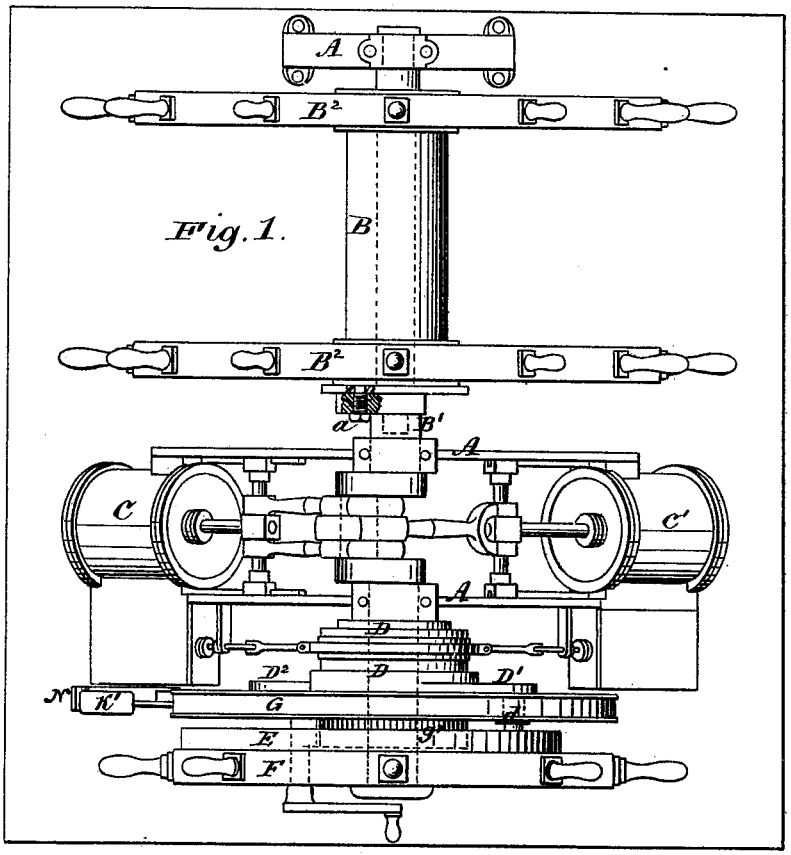


Fig. 2.

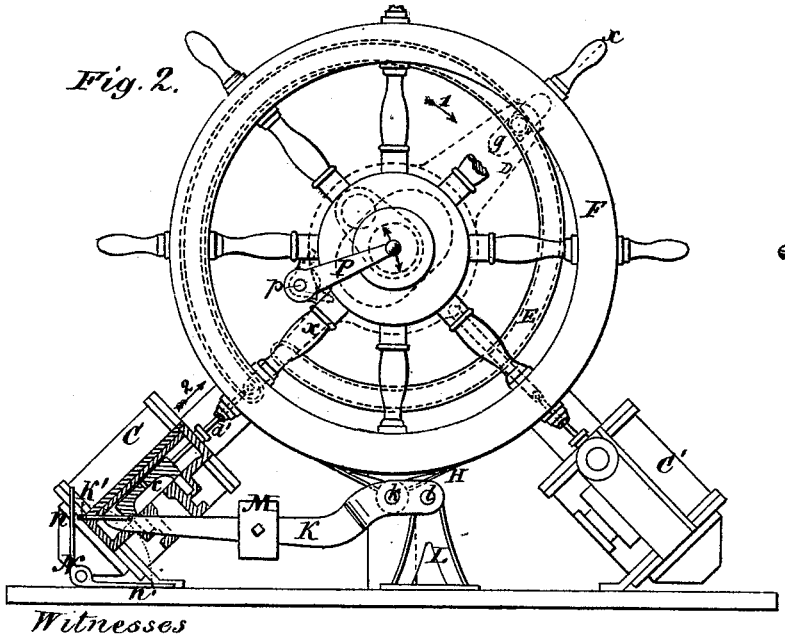
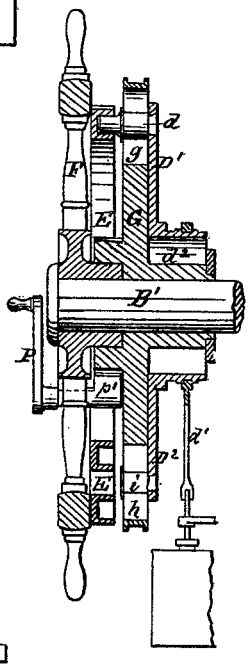


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

FREDERICK E. SICKELS, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM STEERING APPARATUS FOR VESSELS.

Specification forming part of Letters Patent No. **196,709**, dated October 30, 1877; application filed August 28, 1877.

To all whom it may concern:

Be it known that I, FREDERICK E. SICKELS, of New York city, in the county and State of New York, have invented certain new and useful Improvements in Steam Steering Apparatus; and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents a top view of the steam steering apparatus. Fig. 2 represents a front view of the same with one steam-chest in section. Fig. 3 represents a vertical central section on the line *x x* of Fig. 2.

In operating steam steering-engines, in which the valve is moved by the steersman to admit the steam, the momentum of the engine has a tendency to first close the valve and then apply steam in the opposite direction. The less the lap on the valve, and the greater the momentum of the moving parts, the stronger is the tendency to thus overrun and make the steering-engine move with an unsteady motion, as they vibrate first one way and then the other, particularly when the engine is made extremely sensitive. To obviate this difficulty various complicated mechanisms have been resorted to with indifferent results.

The object of my invention is to accomplish the desired result by very simple means, mainly by the use of an adjustable brake, to create friction, and to arrest the vibratory action of the valve motion, so that great accuracy in the relative motion of the steering-engines can be obtained by the steersman, at the same time great rapidity in moving the rudder is secured, as the motion of the pistons can be made to respond to the least touch of the steersman's hand.

In keeping a vessel upon her course in ordinary weather only slight changes in the position of the rudder are necessary, but the difficulty has been to produce a slight motion, of one spoke or less, of the wheel by a steam steering apparatus as it is done with a hand steering apparatus. At the same time it is desirable to have the power and means at hand to very rapidly move the rudder to hard aport or starboard, as required in an emergency—as, for instance, in running in a fog, when liable to collision.

My invention relates to improvements in machinery for steering vessels by power.

The invention consists in combining a valve motion that is acted on by both the steersman and the steering-engines, by means of an eccentric, pin, and grooved cam, or the equivalents thereof, with a friction-wheel connected to said eccentric, and an adjustable friction-brake that will absorb the surplus momentum of the steering-engines, and thus prevent them from moving farther than desired.

It also consists in a device used to release the engines from the controlling action of the brake, so that the whole power can be used to rapidly move the rudder.

It also consists in a locking mechanism to connect rigidly the steering-engines to the valve-motion, so as to move the engines very rapidly without handling the spokes of the steering-wheel.

In the drawings, A represents the frame supporting the tiller-rope drum B and engine-shaft B^1. At each end of the drum B is placed a steering-wheel, B^2, to be used when it is desired to steer a ship by hand. For this purpose the drum is disconnected from the engine-shaft by partly unscrewing the bolt *a* that unites the two together. The engine-shaft is rotated by steam acting upon the pistons of the cylinders C and C′, the piston-rods and connecting-rods transmitting the power directly to the crank of the engine-shaft B^1. The slide or balance valve *c*, Fig. 2, playing in the steam-chest of each cylinder, is operated by an eccentric, D, slotted at the center, as shown at d^2, Fig. 3, and adjustably connected by means of an arm, D′, and pin *d*, with a grooved cam, E, that regulates its action. This grooved cam E is attached to the steering-wheel F loose on the shaft, and operated by the steersman in steering by steam-power. To the engine-shaft B^1 is securely attached the brake-wheel G, slotted at *g* to permit the pin *d* to pass through and enter the grooved cam E. The wheel G is also slotted at *h* to receive a flanged pin, *i*, that unites it to the arm D^2 of the eccentric D, to hold the two together at opposite sides and reduce the friction upon the parts; the arm D^2 and pin *i* may otherwise be dispensed with. The brake-strap H, which should preferably be lined with wood, encircles the brake-wheel

G. The two ends of said strap H are attached at *k* to the brake-lever K, the latter being pivoted at *l* to the standard L. Upon the brake-lever K is placed a weight, M, that can be shifted and adjusted to produce the required friction upon the brake-wheel. The extremity of the brake-lever forms a treadle, K′, upon which the steersman can place one of his feet to temporarily regulate the pressure on the brake-wheel. N represents a bell-crank lever pivoted to the deck near the end of the treadle K′. In certain emergencies, when the whole power of the engine is required, the arm *n* of the bell-crank lever N is forced down by the steersman's foot, raising the arm *n′* under the treadle of the brake-lever, locking it up, and releasing the engine of a portion or of all the friction that may otherwise be caused by the brake. As additional means of obtaining not only the whole power, but the whole speed of the engines, without requiring the helmsman to handle the spokes of the wheel F, I have pivoted to it at *p* a locking-lever, P, carrying a double clutch, *p′*, that can be made to engage by a single motion on either side of the center with ratchet-teeth *g′* formed on the hub of the brake-wheel G, and thus compel the steering-wheel to move with the engine in either direction, as required.

The wheelsman, in turning the steering-wheel F in the direction of the arrow 1, will draw the eccentric D and its valve-rod *d*¹, attached to the steam slide-valve *c*, in the direction of the arrow 2, and thus apply steam to the lower side of the piston in the cylinder C, and thus cause the engine-shaft to move around in the same direction as the steering-wheel had been moved; but the momentum acquired by the engine will cause it to move around after closing the steam-port and opening the exhaust at the under side of the piston in the cylinder C until the pin *d* is carried around in the cam E far enough to draw the eccentric down and open the steam-port leading to the top of the piston, and thus cause a reverse movement of the engine, resulting in a vibrating motion. This defect is remedied by the friction-brake, which will arrest the engine before its momentum has carried it far enough to open the steam-port on the opposite side of the piston, so that while the steering-wheel tends to open the steam-port, and the motion of the engine tends to close it, all vibration will be obviated by the use of said brake.

The description of one position of the engine (in which steam, air, or other elastic fluid may be used) and one valve will illustrate the action for both valves in different positions of the engine. These valves should be balanced or easily moved to answer promptly the motions of the steersman. The connection between the steering-wheel and the steering-engines, in which the steersman applies the steam and the motion of the engines tends to shut it off, may be of any of the usual modes of construction. For example, as I have ascertained by various experiments, a lever may be used in place of the eccentric arm and cam, said lever being connected at one extremity to the engine-shaft or brake-wheel, and at the other to the steering-wheel, and carrying at an intermediate point the eccentric-pin that works the valve. Having thus obtained full control of the steering-engines, and great accuracy in answering to very slight motions of the steering-wheel, the engines may be geared so as to make only a few revolutions in putting the helm hard over, and thus rapidly move the rudder.

Having fully described my invention, I claim—

1. In a steam steering apparatus, the combination of a valve-motion operated by both the steersman and the steering-engines, by means of an eccentric-pin and grooved cam, or the equivalents thereof, with a friction-wheel connected to said eccentric, and an adjustable friction-brake, to absorb the surplus momentum of the steering-engines, and keep them from moving farther than desired, substantially as described.

2. The bell-crank lever N, or its equivalent, in combination with the adjustable brake of a steam steering apparatus, to release the engines from the brake, so that the whole power can be used to rapidly move the rudder, substantially as described.

3. The locking-lever P, in combination with the ratchet-wheel *g′*, attached to the engine-shaft, and steering-wheel of a steam steering apparatus, substantially as and for the purpose described.

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