3 Sheets—Sheet 1.

J. P. MANTON.

Steam Steering-Apparatus.

No. 208,833. Patented Oct. 8, 1878.

Fig. 1.

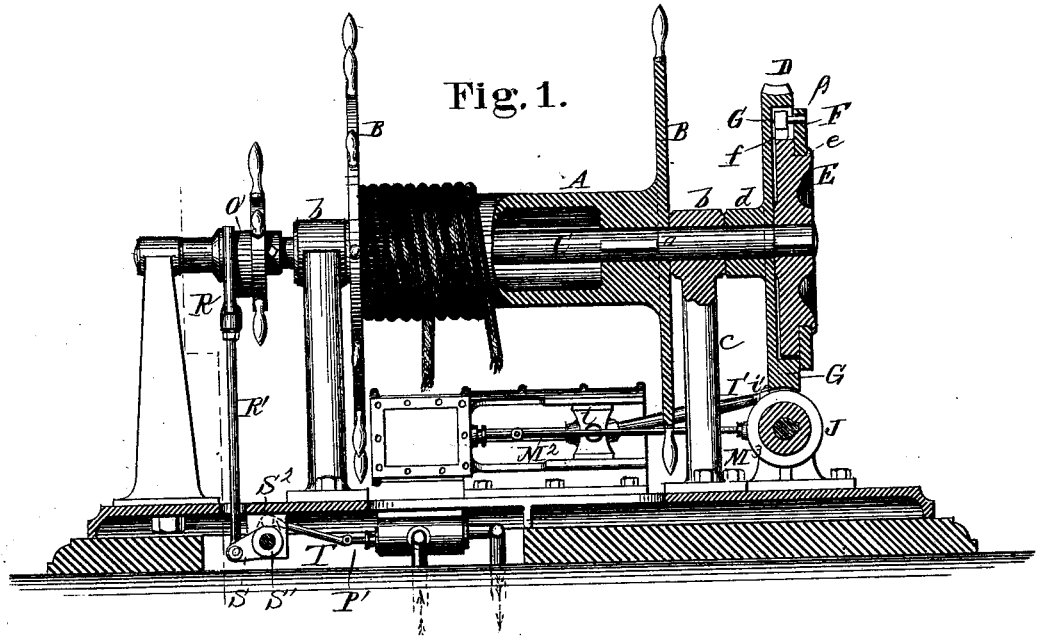
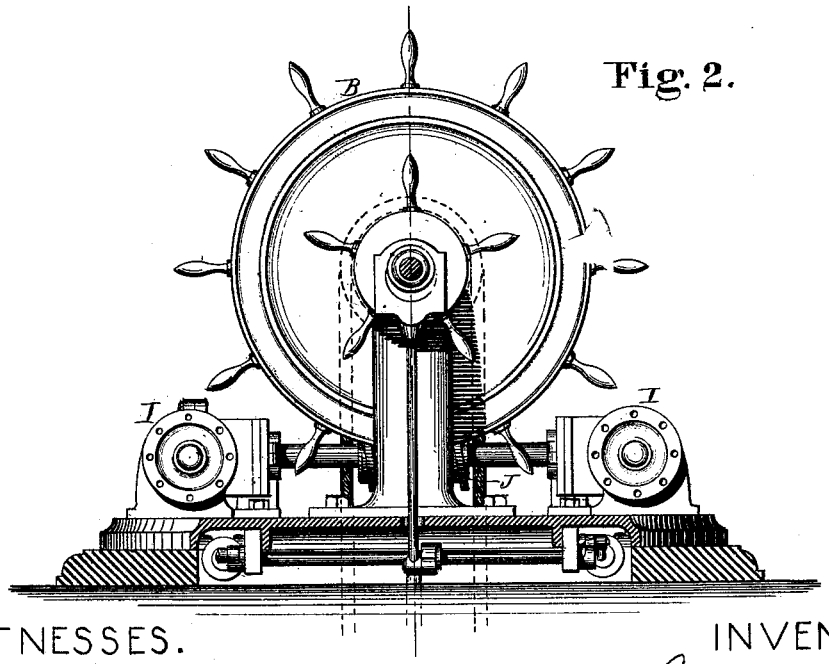


Fig. 2.



WITNESSES.

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Steam Steering-Apparatus.

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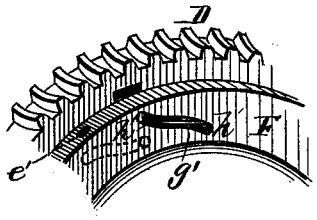

Fig 3.

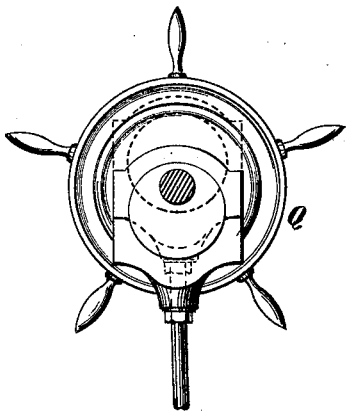

Fig. 4.

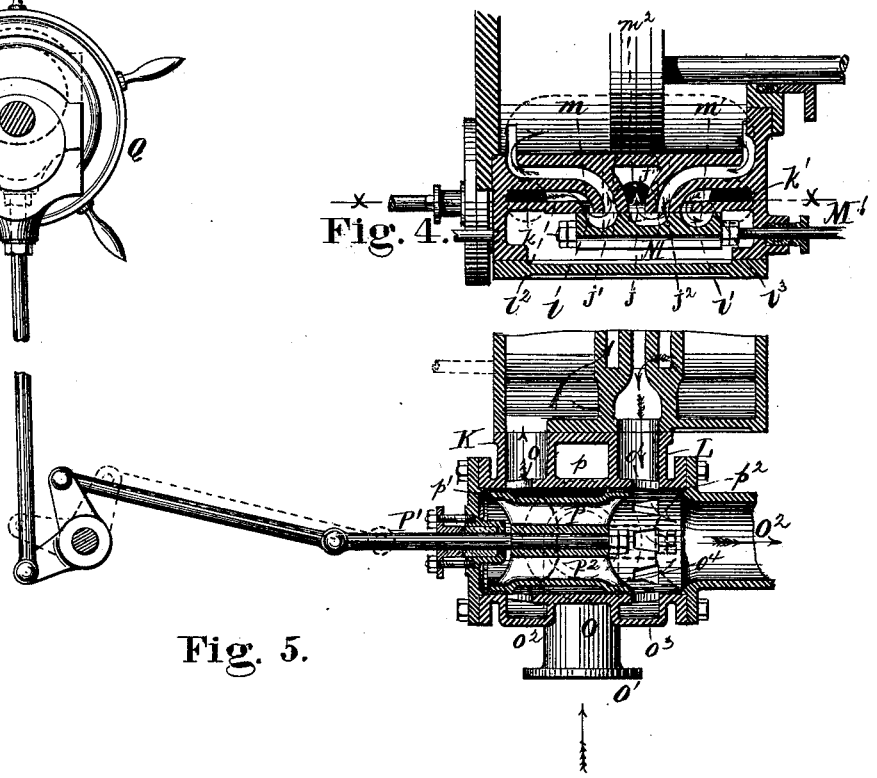

Fig. 5.

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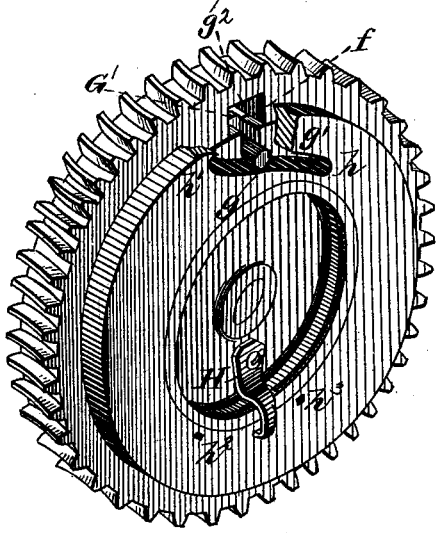
No. 208,833. Patented Oct. 8, 1878.

Fig. 5.



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UNITED STATES PATENT OFFICE.

JOSEPH P. MANTON, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN STEAM STEERING APPARATUS.

Specification forming part of Letters Patent No. **208,833**, dated October 8, 1878; application filed September 13, 1878.

To all whom it may concern:

Be it known that I, JOSEPH P. MANTON, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Steering Apparatus; and I do hereby 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in steering apparatus, the object being to provide a steering-gear of such construction that it may be operated by hand in the ordinary manner, and also be operated by steam-power in such a manner that the rudder will be moved by the power of steam, and held in any desired position by worm-gearing.

My invention consists, first, in the combination, with a hand steering-gear, of worm-gearing, constructed to be connected with or disconnected from the shaft of the hand steering-gear, and suitable steam-engines for actuating the worm-gearing, whereby the rudder of a vessel may be moved by hand or steam, and held in any position desired by worm-gearing.

My invention further consists in the combination, with the shaft of a hand steering-gear having a worm-gear loosely journaled thereon, of an annular rotary locking-disk for connecting and disconnecting the worm-gear and shaft of the hand steering-gear.

My invention further consists in certain other novel features in the construction and combinations of parts, as will hereinafter be described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of my improved steering apparatus. Fig. 2 is an end view of the same. Fig. 3 is an enlarged view of a portion of the gear-wheel and revolving locking-disk. Fig. 4 is a vertical section through the slide-valves and ports of the steam-engine; and Fig. 5 shows a differential valve for regulating the flow of steam to and from the cylinders of the steam-engines. Fig. 6 is an enlarged view of a section of the gear-wheel and connecting and disconnecting devices.

A is the barrel, and B the hand-wheels, of a hand steering-gear. C is a shaft, to which the barrel B is rigidly secured by keys *a*, or in any other desired manner.

Shaft C is supported in suitable bearings *b* in the upright posts or standards *c*. On one end of the shaft C is loosely journaled a gear-wheel, D, which is preferably constructed with a hub or an elongated bearing, *d*, on one side thereof, in order to insure an extended bearing on the shaft and prevent lateral movement or wabbling of the gear-wheel.

The outer face of gear-wheel D is recessed for the reception of a disk, E, which is rigidly secured to the shaft C.

Within an annular groove, *e*, in the periphery of disk E is placed an annular locking disk or ring, F, which is free to turn on the disk E, and is provided with any desired number of sockets *e'* in its periphery to admit of the insertion of a hand-bar to turn the same.

The periphery of the disk E is provided with an open slot or recess, *f*, in which is placed a a block, G, having a shank, *g*, which latter portion projects through an inclined slot, g^1, in the movable ring or disk F. The projecting flange G' of the gear-wheel is also provided with any desired number of open slots or recesses g^2, which correspond in size and shape to the recess *f* in disk E.

When it is desired to lock the gear-wheel D to the shaft C the latter is turned by the hand-wheels until the shank or pin *g* is brought into line with one of the recesses g^2 in the gear-wheel. The ring F is then turned toward the right or in a direction to force the shank *g* of the locking-block G from the inner end, *h*, of the inclined slot g^1 to its outer end, h^1, and thus raise the block G a sufficient distance to connect the gear-wheel with the disk E and cause it to be revolved in unison therewith.

While any suitable mechanism may be employed for retaining those parts in a locked position, I have illustrated one method for effecting this end. To the disk E is secured a spring, H, the free end of which rests against the outer face of the revolving ring F, the latter being provided with notches or depressions h^2 h^3 diametrically opposite the ends of the inclined slot. When the ring is in a locked

position, the free end of the spring engages in the depression or notch h^2 and retains the parts against displacement.

When it is desired to operate the hand steering-gear, the ring F is turned in the opposite direction until the shank of the engaging-block is situated at the inner end of the inclined slot; and when in this position the free end of the spring will rest in the notch or depression h^3 and hold the parts in an unlocked position.

I would have it understood that I do not limit myself to these particular devices for effecting this result, as many other devices might be employed for the same purpose.

I I are two high-pressure steam-engines, preferably located on opposite sides of the hand-steering gear, and arranged to connect with the driving-shaft by pitmen I′, the inner ends of which are attached to cross-heads *i*, and outer ends to cranks *i′* on opposite ends of the driving-shaft. J is a worm attached to the driving-shaft, and arranged to engage with the cogs of the gear-wheel D. Each one of the steam-engines is constructed with a central exhaust-port, *j*, and steam-ports j^1 j^2, leading to opposite ends of the cylinder. A suitable steam-pipe, K, conveys steam to the passages *k k′*, located near the opposite ends of the cylinder, while the exhaust-steam is conducted from the cylinder by means of the exhaust-pipe L. Ports *l l′* are connected by steam-passages l^2 l^3 with the steam-inlet passages *k k′*. M is a B-valve, the stem M^1 of which is attached to one end of a connecting-rod, M^2, the opposite end of the latter being attached to an eccentric-strap, M^3, surrounding the driving-shaft. Valve M is provided with steam-passages *m* m^1 and exhaust-passage m^2.

When the valve is in the position illustrated in Fig. 4, steam is admitted through steam-inlet *k*, passage l^2, and port *l*, through the steam-passage *m* in the valve, into the steam-port j^1, to the left-hand end of the cylinder, and serves to drive the piston to the right. The steam on the opposite side of the piston exhausts through port j^2, through exhaust-steam passage m^2, into the central exhaust-passage. When the valve is reversed, steam will be admitted to the right-hand end of the cylinder, and exhausted from the opposite end, as above described.

Fig. 5 illustrates the construction of valve and operating mechanism for regulating the flow of steam to and from the engine. O is a valve-casing, provided at or near its center with a steam-inlet passage, O^1, and at one end with an outlet-passage, O^2. Valve-casing is provided with two ports, *o* o^1, located at opposite ends thereof. Port *o* connects with the steam-pipe K, and port o^1 with pipe L. The casing is preferably provided with annular chambers o^2 o^3 surrounding the same, adjacent to ports *o* o^1, and with any desired number of steam passages or openings o^4, through the shell of the casing, to connect its interior with said annular chambers, and thus provide a free passage for the steam inlet and outlet and balance the valve as nearly as is possible.

P represents a hollow cylindrical valve constructed with suitable wings for the attachment of the valve-stem P^1 to a central hub, P^2. The periphery of the valve is provided with an annular recess, *p*, while its opposite ends or pistons p^1 p^2 are of sufficient width to slightly overlap the ports, and are furnished with any form of piston-packing desired.

When the valve is in the position illustrated in Fig. 5, steam will enter the inlet-passage to the casing and flow through the annular recess *p*, and from thence through the port *o* to the steam-pipe leading to the engine, while the steam is exhausted through port o^1 and flows out through the exhaust-passage connecting with the end of the valve-casing.

When it is desired to reverse the engines, the hollow valve is shifted to the opposite end of the casing, when steam will flow to the engine through port o^1 and pipe L, while the steam will exhaust through pipe K, port *o*, and through the center of the hollow valve.

Valve P is operated as follows: Upon one end of the shaft C of the hand steering-gear is placed a trick-wheel, Q, which is provided with an eccentric-bearing, Q′. An eccentric strap or plate, R, is fitted on the bearing Q′, and has one end of a rod, R′, attached thereto, the opposite end being pivoted to a crank, S, secured to a rock-shaft, S^1. The ends of the rock-shaft S^1 are provided with cranks S^2, to which are pivoted connecting-rods T, the opposite ends of which are pivoted to the valve-rods P^1. By turning the trick-wheel either to the right or left the rock-shaft is turned in its bearings and the hollow valves moved either to the right or left, as desired.

When the gear-wheel is disconnected from the shaft of the hand-gear the latter is operated in the ordinary manner; but when from any cause it is desired to provide increased power, both for moving the rudder and for holding the same, the gear-wheel is readily locked to the shaft in the manner heretofore described, and by operating the trick-wheel the rudder may be moved either to larboard or starboard, and held in any desired position by the worm-gearing.

It will be observed that, owing to the large size of the gear-wheel, as compared with the diameter of the worm, the cogs on the gear-wheel are of low pitch, so that the worm-gearing constitutes a perfect lock for the steering apparatus and prevents any sudden shocks or strains on the steam-engines, the only office of the latter being to move the rudder the desired direction and distance.

It is evident that many changes in slight details of construction, and also in the relative arrangements of the several parts of the apparatus, may be resorted to without departing from the spirit of my invention; and hence

I would have it understood that I do not limit myself to the exact construction shown and described; but,

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a hand steering gear, of a gear-wheel adapted to be locked to the shaft of the hand-gear and a driving-shaft operated by one or more steam-engines, said driving-shaft provided with a worm, which is in constant engagement with said gear-wheel, substantially as set forth.

2. The combination, with the shaft of a hand steering-gear, of a gear-wheel provided with an elongated hub or bearing projecting from one side thereof and a disk or wheel located on the opposite side of the gear-wheel and rigidly secured to the shaft of the hand-steerer, substantially as set forth.

3. The combination, with a disk attached to the shaft of a hand steering-gear, said disk provided with a catch or locking block, of a gear-wheel loosely secured upon said shaft and constructed with recesses (one or more) for the reception of said locking-block, and means for moving said block into and out of the recesses in the gear-wheel, substantially as set forth.

4. The combination, with the shaft of a hand steering-gear, of a gear-wheel loosely mounted on said shaft, said gear-wheel having a recess formed in one side thereof, and a disk rigidly secured to the shaft and fitting within said recess in the gear-wheel, substantially as set forth.

5. The combination, with a gear-wheel loosely mounted upon the shaft of a hand steering-gear, and a disk or wheel rigidly secured thereto, of a revolving ring provided with an inclined slot and a locking-block, a portion of which projects into said inclined slot or opening, substantially as set forth.

6. The combination, with a gear-wheel loosely mounted upon the shaft of a hand-steerer, a wheel or disk rigidly secured thereto, and a revolving ring for actuating the connecting and disconnecting mechanism, of means for securing the ring to the wheel or disk on the shaft, substantially as set forth.

7. The combination, with a valve governing the flow of steam to the steam-engines of a steam steering apparatus, of a trick-wheel constructed with an eccentric-bearing, an eccentic strap or plate fitted to said eccentric-bearing on the trick-wheel, and suitable intervening mechanism connecting the eccentric strap or plate with the steam-valve, whereby the position of the latter may be regulated by turning said trick-wheel, substantially as set forth.

8. The combination, with a valve constructed and arranged to regulate the flow of steam to the engines of a steam steering apparatus, of a trick-wheel constructed with an eccentric-bearing and a rod connected therewith by a suitable strap or plate, the opposite end of the rod being pivoted to a crank on a rock-shaft, which latter in its movement actuates the valve by means of a connecting-rod, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 10th day of September, 1878.

JOSEPH P. MANTON.

Witnesses:

HENRY J. SPOONER,

J. T. P. BUCKLIN.